LPOD-R

Outdoor Amplifier / Block Up Converter (BUC)
Installation and Operation Manual

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

This manual is applicable to LPOD-R units as listed:

- LPOD-R PS 1 and 1.5 units, all firmware versions.
- LPOD-R PS.5 units, firmware FW-0020841 and later.

Earlier LPOD-R PS 0.5 units with FW-0020765 are documented in the LPOD-R manual, revision 0.

Part Numbers: CD-LPOD R or MN-LPODR Revision 1

LPOD-R

Outdoor Amplifier / Block Up Converter (BUC)
Installation and Operation Manual

Part Number: CD-LPODR or MN-LPODR
Revision 1

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Errata A for MN-LPOD-R Rev 1

Comtech EF Data Documentation Update

LPOD-R

Outdoor Amplifier / Block Up Converter (BUC)
Installation and Operation Manual

Part Number: CD-LPODR or MN-LPODR
Revision 1

Subject: Update Section 2.3, added KT-0020987, LPOD-R PS.5 OMT Mounting Kit

Errata Part Number: ER-LPODR-EA1 (*Errata documents are not revised)*

PLM CO Number: C-0032769

Comments: See attached page(s). The new information will be included in the next released revision of the manual.

2.3 Single Thread (Standalone) LPOD-R Installation

Kits to mount and install a standalone LPOD-R are available from Comtech EF Data. Kit part numbers vary depending on the unit type and operational frequency. See Appendix A. CABLE DRAWINGS for information about the cables that are available for the LPOD-R in standalone operation.

CEFD PART NO.	DESCRIPTION	FIGURE
PL/12319-1	Universal Pole Mounting Kit	Figure 2-6
KT-0000095	LPOD-R PS 1/PS 1.5 Single Unit Mounting Kit	Figure 2-7
KT-0020987	LPOD-R PS.5 OMT Mounting Kit	Figure 2-8

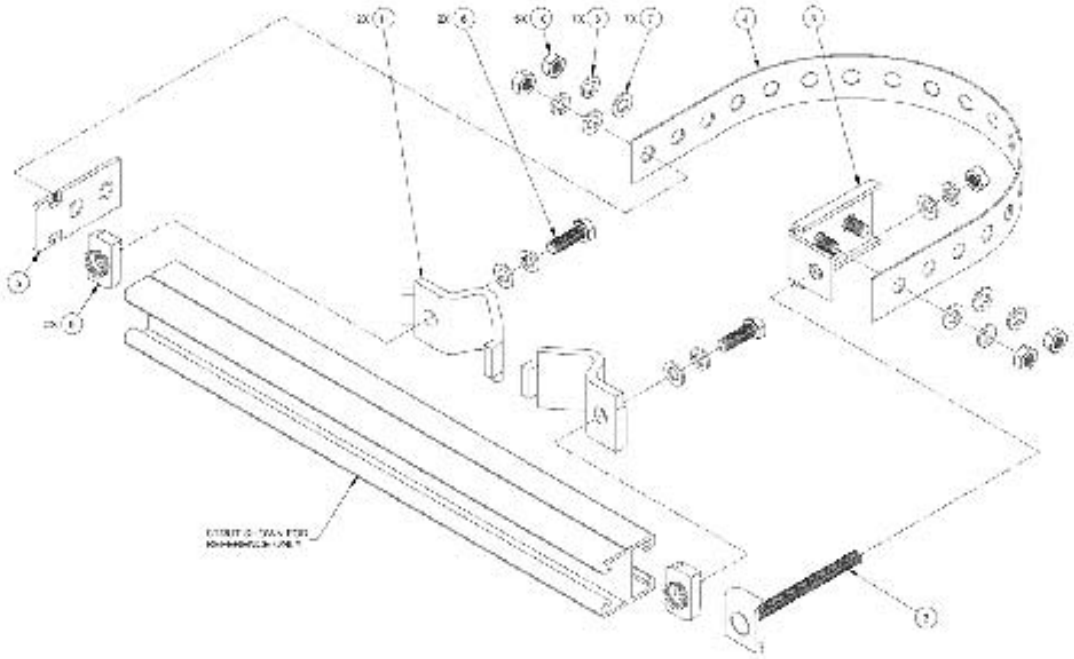

Figure 2-6. PL/12319-1 Universal Pole Mounting Kit

ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	N/A	BRACKET, UNISTRUT (SHOWN FOR CLARITY ONLY, INCLUDED SEPARATELY IN CEFD MOUNTING KIT, e.g., P/N FP/BR0078, PART OF P/N KT-0000095)
2	1	FP/BR0072	BRACKET, STRAP TENSIONER
3	1	FP/BR0070	BRACKET, STRAP-TERMINATION POLE MOUNTING KIT
4	1	FP/BR0071	BRACKET, 1-1/4 STRAP (TRIM LENGTH AS REQUIRED)
5	1	FP/BR0069	BRACKET, STRAP-FIXED, POLE MOUNTING KIT
6	2	HW/M8X1.25X25HEXSS	BOLT, HEXHEAD, M8X1.25X25, SS
7	7	HW/M8FLATSS	WASHER, FLAT, M8 SS, METRIC
8	7	HW/M8LOCKSS	LOCK WASHER, SPLIT, M8, SS, METRIC
9	2	HW/M8SPRINGNUT	SPRINGNUT, M8X1.25
10	5	HW/M8X1.25MMHEXNUTSS	NUT, HEX M8X1.25X16MM, SS
11	2	HW/BLK-PIPE2-8	PIPE, BLOCK

This kit accommodates a pole diameter (OD) of up to 13.00" (33.02 cm) maximum.

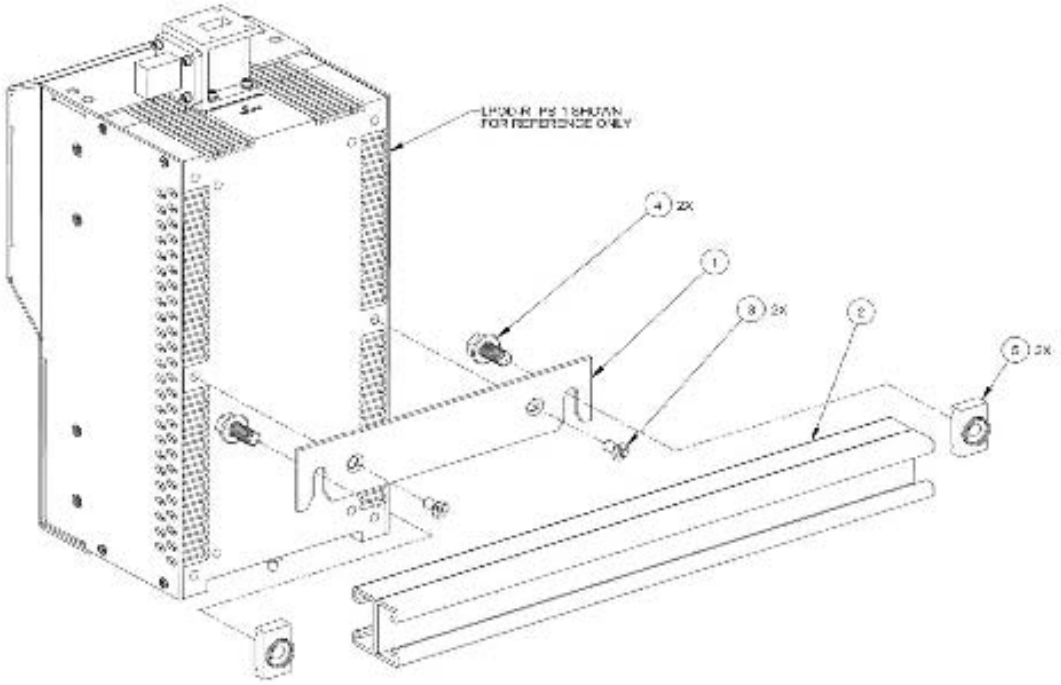

Figure 2-7. KT-0000095 LPOD-R PS 1, 1.5 Single Thread Mounting Kit

ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	FP-0000534	BRACKET, MOUNTING
2	1	FP/BR0078	BRACKET MODIFICATION POLE MOUNTING KIT
3	2	HW/1/4-20X1/2FH	SCREW, 1/4-20 X 1/2 FH PHIL, 82, UCUT, SS
4	2	HW-0000070	SCREW, HEX, SERR FLANGE HD, 3/8-16 x 3/4, SS
5	2	HW/3/8SPRINGNUT	SPRINGNUT, 3/8-16, SHORT SPRING, SS (P3300)

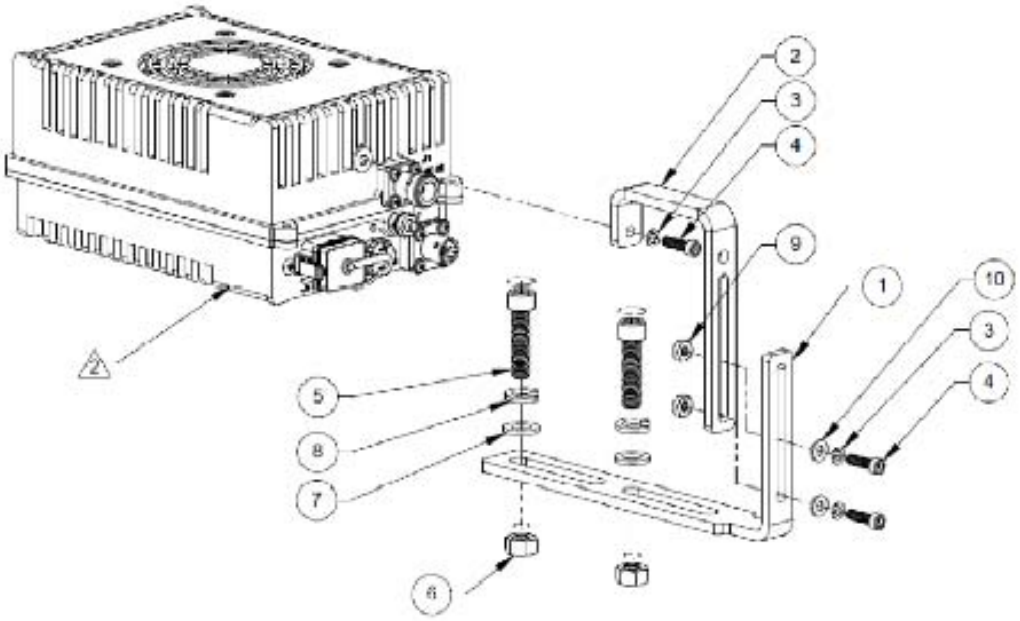

Figure 2-8. KT-0020987 LPOD-R PS.5 OMT Mounting Kit

ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	FP-0021719	BRACKET, LOWER, OMT MOUNTING KIT FOR LPOD PS.5
2	1	FP-0021720	BRACKET, UPPER, OMT MOUNTING KIT FOR LPOD PS.5
3	3	HW/8-SPLIT	#8 SPLIT LOCK WASHER S.S.
4	3	HW/832X5/8SHCS	SCREW, 8-32 X 5/8 SHCS, SS
5	2	HW/5/16-18X1.25	5/16-18X1.25 HEX HEAD BOLT SS
6	2	HW/5/16-18HEXNT	5/16-18 HEX NUT, S.S.
7	2	HW/5/16-FLT	FLAT WASHER, 5/16
8	2	HW/5/16-SPLIT	5/16 SPLIT LOCK WASHER
9	2	HW/8-32HEXNUT	8-32 HEX NUT S.S.
10	2	HW/8-FLT	#8 FLAT WASHER S.S.

2.4 Set the LPOD-R Power On

WARNING

For safety reasons, NEVER TURN THE UNIT ON WITHOUT PROPER WAVEGUIDE TERMINATION ON THE J2 | RF OUT PORT. INDIVIDUALS CAN OTHERWISE BE EXPOSED TO DANGEROUSLY HIGH ELECTROMAGNETIC LEVELS.

The LPOD-R does not contain a Power On/Off switch. It is powered ON by connecting the J3 | POWER IN connector to the appropriate prime power source. The Mute or Transmit status of the unit will automatically come up in the last stored state (factory default = Transmit on, not muted).

2.4.1 Monitoring LPOD-R Operation with the LED Indicator (PS .5 ONLY)

The LPOD-R PS .5 features a multi-color Light-Emitting Diode (LED) Indicator. Figure 2-9 shows the location of this feature, on the signal output side of the LPOD-R PS .5 housing, next to the ground lug. This LED provides you with visual cues to the operational status and LO setting for the system.

Figure 2-9. LPOD-R PS .5 LED Indicator

A steadily-lit LED indicates that the unit is set for standard 14.0-14.5 GHz uplink frequency. A blinking LED indicates that the unit is set for 13.75-14.5 GHz Tx frequency. Upon power-up of the unit, the LED indicates operating status as per the following table:

OPERATING STATUS	LED COLOR	UNIT STATE
Standard 14.0-14.5 GHz Uplink Frequency	Green	Unmuted, 13.05 GHz LO
	Yellow	Muted, 13.05 GHz LO
	Red	Faulted, 13.05 GHz LO
13,.75-14.5 GHz Tx Frequency Operation	Green (blinking)	Unmuted, 12.8 GHz LO
	Yellow (blinking)	Muted, 12.8 GHz LO
	Red (blinking)	Faulted, 12.8 GHz LO

Errata B for MN-LPOD-R Rev 1

Comtech EF Data Documentation Update

LPOD-R

Outdoor Amplifier / Block Up Converter (BUC)
Installation and Operation Manual

Part Number: CD-LPODR or MN-LPODR
Revision 1

Subject: Add Appendix C. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT, Customer Commands, all but PS.5 packages

Errata Part Number: ER-LPODR-EB1 (*Errata documents are not revised)*

PLM CO Number: C-0033316

Comments: See attached page(s). The new information will be included in the next released revision of the manual.

Appendix C. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT, Customer Commands, all but PS.5 packages

NOTE: To ensure optimal performance and to access the most current remote commands and queries, it is important to operate the LPOD-R with its latest available firmware.

C.1 Scope

This document contains LPOD-R family of microwave products specifications as follows:

- Operating features of the BUC/SSPA
- Key parameters and procedures
- Detailed descriptions of remote control communication commands

C.2 Key Operational Parameters / Common Commands and Queries)

C.2.1 RF Input Level

The required RF input level to reach the full rated output power of the SSPA is determined by the individual amplifier temperature compensated gain and specified power rating. For example, if the test data of an SSPA rated for 250W (54 dBm) indicated a temperature compensated gain of 75 dB, then a signal of:

54dBm – 75 dB = -21 dBm

would yield the approximate rated output power. Increasing input power beyond this level would result in an output signal with increasingly higher levels of distortion. Of course, if the BUC/SSPA attenuation control is utilized, a higher level input signal level can be accommodated. The maximum input level should never exceed 10dBm, or permanent damage to the unit may occur.

C.2.2 Attenuator Control

The BUC/SSPA gain can be attenuated over its specified range by exercising the "ATT" command. The details for the format of this command are found later in this section.

C.2.3 Mute Control

The BUC/SSPA may be muted via software. Exercising the MUT=1 command will "software" mute the unit. The Mute command provides over 75 dB of RF on/off isolation.

However, the Mute command only turns off the first few low power stages of the amplifier, the high power stages remain on. By allowing the higher power transistors to stay on, the BUC/SSPA remains in more thermally stable state should the mute condition be removed. If the user desires to completely turn off the bias to the entire amplifier, both the MUT=1 and AMP=0 commands should be executed.

For normal transmit operation, MUT=0 and AMP=1 are required.

C.2.4 Faults

The M&C system monitors certain key functions of the BUC/SSPA for proper operation. Should any of these parameters exceed predetermined limits, the M&C system will declare a fault. The conditions that trigger a fault are:

- Any power supply outside its nominal value window
- A fan running at less than 25% of maximum speed
- I2C internal bus communications fault
- Thermal Shutdown – In accordance with SP-0020556.

C.2.5 Power Detector

A power detector is provided to monitor the output power. It has a useful range of over 20 dB, referenced to the unit's rated P1dB point, and its value can be read by exercising the "RMS" command. The test data supplied with each unit gives an indication of the excellent accuracy and flatness of the power monitor over the frequency band of operation.

C.2.6 Some Common Commands

A few of the most common commands and queries are listed below. Full details for each of these are listed at the end of this section.

- RMS = Retrieve Maintenance Status. Displays voltages, fan speeds, Heatsink temperature, output power monitor reading, etc.
- RCS = Retrieve Configuration Status. Displays current attenuation, mute, amplifier, online, etc. status.
- RAS = Retrieve Alarm Status. Displays current alarm or fault status.

C.3 Remote Control Protocol and Structure

This section describes the protocol and message command set for remote monitor and control of the BUC/SSPA product.

The LPOD-R BUC/SSPA product supports the command protocol over a Telnet session through the use of a 10/100Base-T Ethernet connection to the product. The Ethernet communications interface also supports SNMP protocol, and provides a graphical user interface (GUI) through web pages that can be accessed using a web browser.
The BUC/SSPA also supports a Comtech EF Data FSK link that allows one of our modem products to control the BUC/SSPA remotely through the L-Band RF cable.

C.3.1 Basic Protocol

All data is transmitted in framed packets. The host controller is assumed to be a PC or ASCII dumb terminal, which is in charge of the process of monitor and control. The controller is the only device that is permitted to initiate, at will, the transmission of data. Targets are only permitted to transmit when they have been specifically instructed to do so by the controller.
All bytes within a packet are printable ASCII characters, less than ASCII code 127. In this context, the Carriage Return and Line Feed characters are considered printable.
All messages from controller to target require a response (with one exception). This will be either to return data that has been requested by the controller, or to acknowledge reception of an instruction to change the configuration of the target.

C.3.2 Packet Structure

Controller-to-Target						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
< ASCII code 60 (1 character)	(4 characters)	/ ASCII code 47 (1 character)	(3 characters)	= or ? ASCII codes 61 or 63 (1 character)	(n characters)	Carriage Return ASCII code 13 (1 character)

Example: <0412/MUT=1{CR}

Target-to-Controller						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
> ASCII code 62 (1 character)	(4 characters)	/ ASCII code 47 (1 character)	(3 characters)	=, ?, !, or * ASCII codes 61,63,33 or 42 (1 character)	(From 0 to n characters)	Carriage Return, Line Feed ASCII codes 13,10 (2 characters)

Example: >0412/MUT=1{CR}{LF}

C.3.2.1 Start of Packet

These characters are used to provide a reliable indication of the start of packet. They must not appear anywhere else in the body of the message:

- Controller-to-Target: < (ASCII code 60)
- Target-to-Controller: > (ASCII code 62)

C.3.2.2 Address

The Controller sends a packet with the address of a Target – the destination of the packet. When the Target responds, the address used is the same address, to indicate to the Controller the source of the packet. The Controller does not have its own address.

C.3.2.3 Instruction Code

This is a three-character alphabetic sequence that identifies the subject of the message. Wherever possible, the instruction codes have been chosen to have some significance. This aids in the readability of the message, should it be displayed in its raw ASCII form. Upper case and lower case alphabetic characters may be used (A-Z, and a-z).

C.3.2.4 Instruction Code Qualifier

This single character further qualifies the preceding instruction code. Code Qualifiers obey the following rules:

From **Controller-to-Target**, the instruction code qualifiers are:

= (ASCII code 61	This qualifier is used as the command (assignment) operator that instructs that the preceding instruction code should be set to the value of the argument(s) that follow. For example: MUT=1 means 'set the Mute function to Enabled'.
? (ASCII code 63)	This qualifier is used as the query operator that instructs the Target to return (report) to the Controller the current set value for the parameter defined by the preceding instruction code. For example: SWR? means 'return the firmwares installed in the Active and Pending images'.

From **Target-to-Controller**, the instruction code qualifiers are:

= (ASCII code 61)	This qualifier displays in two ways: 1. First, if the Controller issues a command to set a parameter to a particular value, and the sent argument value is valid, then the Target accepts the command by replying with, for example, MUT= (with no message arguments). 2. Second, if the Controller issues a query to a Target (for example, MUT?, meaning '*is the Mute enabled or disabled?*'), then the Target responds to the query with MUT=x (where 'x' represents the configured state – e.g., '1' being 'enabled' and '0' being 'disabled').
? (ASCII code 63)	This qualifier displays only if the Controller issues a command to set a parameter to a particular value, but the sent argument value is not valid. The Target rejects the command and responds to the error by echoing the instruction code, followed by the '?' qualifier, with no message arguments. Example: MUT?
! (ASCII code 33)	This qualifier displays only if the Controller issues an instruction code that the Target does not recognize. The Target rejects the instruction code and responds to the error by echoing the invalid instruction code, followed by the '!' qualifier, with no message arguments . Example: XYZ!

* (ASCII code 42)	This qualifier displays only if the Controller issues a command to set a parameter to a particular value but – even though the argument value is valid – the Target is in the wrong mode (e.g., Local mode instead of Remote mode) and does not permit that particular parameter to be changed at that time. The Target rejects the command and responds to the error by echoing the instruction code, followed by the "*" qualifier, with no message arguments. Example: MUT*
# (ASCII code 35)	This qualifier displays only if the Controller sends an instruction code that the Target cannot currently perform due to hardware resource issues – specifically, if you issue two or more 'hardware configuration' type commands without allowing adequate time, between commands, for the hardware to be configured. If this happens, the Target rejects the instruction code and responds to the error by echoing the invalid instruction, followed by the # character. For example, if you issue commands to change both the frequency (FRQ=) and the attenuation (ATT=) with less than 100 milliseconds between the commands, and the Target responds with ATT#, this means that the attenuation command was rejected and you must resend that command.

C.3.2.5 Optional Message Arguments

Arguments are not required for all messages. Arguments are ASCII codes for the characters 0 to 9 (ASCII 48 to 57), period (ASCII 46) and comma (ASCII 44).

C.3.2.6 End of Packet

- Controller-to-Target: This is the carriage return character (ASCII code 13).
- Target-to-Controller: This is the two-character sequence of carriage return (ASCII code 13) and line feed (ASCII code 10).

Both indicate the valid termination of a packet.

C.4 End-Of-Life Commands

Certain commands (denoted by an * in the Parameter Type field) are being marked as EOL. While these commands are fully supported in this product, it is highly recommended that the equivalent new commands be used for new implementations. The new commands will generally follow the outdated commands.

C.5 Customer Commands and Queries

Alarm Mask Configuration, 16
Attenuation, 8
Auto Fault Recovery, 8
Circuit Identification, 10
Clear All Stored Alarms, 8
Clear All Stored Events, 8
Concise Alarm Status, 9
Concise Configuration Status, 10, 26
Concise Maintenance Status, 11
Concise RF Power FET Current Status, 10
FSK Address, 24
Global Amplifier Configuration, 13
Heatsink Temperature, 26
Initialize Events Pointer, 13
IP Address, 14
IP Gateway, 14
Low Forward Power Threshold, 15
MAC Address, 15
Mute State, 16
Number of Unread Events, 16
Number of Unread Statistics, 17
Part Number, 17
Reboot Command, 19
Remote Address, 24
Retrieve Alarm Status, 18
Retrieve Configuration Status, 19
Retrieve Equipment Type, 19
Retrieve Firmware Number, 12
Retrieve Maintenance Status, 21
Retrieve Next 5 Events, 22
Retrieve Next 5 Statistics, 23
Retrieve next 5 unread Stored Alarms, 15
RF Power Amplifier State, 8
RF Power FET Current status, 20
Serial Number, 23, 24
Set RTC (Real-Time-Clock) Date, 11, 12
Set RTC Time, 26
Software Image Selection, 13
Statistics Averaging, 12
Statistics Interval, 25
Statistics Pointer Initialization, 14
Summary Fault Status, 24
Terminal Status Change, 27
Total Number of Alarms, 26

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Auto Fault Recovery	AFR=	1 byte	Command or Query. The LPOD output will automatically be muted if the following fault conditions occurs: BUC lock detect fault, If auto fault recovery is enabled, it will cause the output return to its pre-fault mute condition if all faults are cleared. If disabled, the output will remain muted even if all faults are cleared. **Example:** <1/AFR=1'cr' >0001/AFR='cr''lf' **Default Value:** 1	AFR= AFR? AFR*	AFR?	AFR=x (Same format as command arguments.)
RF Power Amplifier State	AMP=	1 byte	Command or Query. Turns ON or OFF the RF power amplifiers. 0 = Off 1 = On **Example:** <1/AMP=1'cr' >0001/AMP='cr''lf' **Note:** turning the amplifier off will disable the +10V supply, and mask it during fault checking. **Default Value:** 0	AMP= AMP? AMP*	AMP?	AMP=x (Same format as command arguments)
Attenuation	ATT=	5 bytes	Command or Query. Valid attenuation level (00.00 to 20.00), in dB, in 0.25 dB steps as factory default. **Example:** <1/ATT=12.25'cr' >0001/ATT='cr''lf' **Default Value:** 10.00	ATT= ATT? ATT*	ATT?	ATT=xx.xx (Same format as command arguments.)
Clear All Stored Alarms	CAA=	None	Command only. Instructs the unit to clear all Stored Alarms. This command takes no arguments. **Example:** <1/CAA='cr' >0001/CAA='cr''lf'	CAA= CAA*	N/A	N/A
Clear All Stored Events	CAE=	None	Command only. Instructs the SSPA to clear all Stored Events. This command takes no arguments. **Example:** <1/CAE='cr' >0001/CAE='cr''lf'	CAE= CAE*	N/A	N/A

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Alarm Status	N/A	44 bytes	Query only. Used to Query the Alarm status of the unit, response is semicolon delimited. This is the concise version of the RAS command. **Example:** CAS=a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s;'cr''lf' where: a thru z = 0, 1, 2, 3, 4, or 5 0 = FT, 1 = OK, 2 = AL, 3 = NO, 4 = YS, 5 = MS a = +24V Power Supply b = +24V Switch Power Supply c = +13/18V LNB Power Supply (see **Note**) d = +13.5V Power Supply e = +10V Power Supply f = +10V1 RF Amplifier Power Supply g = +10V2 RF Amplifier Power Supply (see **Note**) h = +7.8V Power Supply i = +5.8V Power Supply j = +2.5V Power Supply k = +1.2V Power Supply l = -5.8V Power Supply m = Fan#1 State n = Fan#2 State (see **Note**) o = Heatsink Temp p = Overtemp Shutdown q = IIC Status r = Forward Power Alarm s = Flash Checksum t = FPGA Done u = BUC Lock Detect (see **Note**) v = External Ref Lock Detect (see **Note**) w = LNB Current (see **Note**) x = Redundant Switch Condition (see **Note**) y = Redundant Link Status (see **Note**) z = Terminal Status Change **Note:** fields b, c, g, v,w,x,y are not used. **Note:** fields n (FAN2) is support on PS1.5 only.	CAS=	CAS?	CAS=x….x (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Configuration Status	N/A	26 bytes	Query only. Used to query the configuration status of the unit. This is the concise version of the RCS command. **Example:** CCS=aa.aa;b;c;d;e;ff.ff;g;hhh; 'cr''lf' Where: aa.aa = attenuation in dB (ATT) b = RF power amplifier state, 0 = Off, 1 = On (AMP) c = mute state, 0 = un-muted, 1 = muted (MUT) d = online status (ONL) e = redundancy state and mode (ESW) ff.ff = Attenuator offset in dB (AOF) g = auto fault recovery mode (AFR) hhh = External reference status, N/A = no external reference, 05M for 5 MHz, and 10M for a 10 MHz (See Note) **Note:** fields d, e, f, hhh are not used.	CCS=	CCS?	CCS=x....x (See description for details of arguments)
Concise RF Power FET Current Status	N/A	Variable length depending on the number of FETs installed in the amplifier	Query only Concise version of RFS. **Example:** CFS=.xxx;.xxx;xx.x;x.....;xx.x;	CFS=	CFS?	CFS=x.....x (See description of RFS. Note that each argument is separated by a semicolon delimiter.)
Circuit Identification	CID=	48 bytes	Command or Query. CID is a user-defined string of data that may be used to identify or name the unit or station. The CID is a 48-byte field of data that is entered as one line, but it will be read back from the unit as two 24-byte lines of data. **Examples:** <1/CID= Station #001--SSPA #01--'cr' >0001/CID= <1/CID?'cr' >0001/CID='cr' Station #001'cr' --SSPA #01--'cr''lf' **Default Value:** ------CID MESSAGE------- ------------------------	CID= CID? CID*	CID?	CID=x...x (See description for details of arguments.)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Maintenance Status	N/A	95 bytes	Query only. Used to Query the Maintenance status of the unit in a concise format. The response is semicolon delimited. This is the concise version of the RMS command. **Example**: <1/CMS? >0001/CMS=aaa.a;bbb.b;ccc.c;ddd.d;eee.e;fff.f; ggg.g;hh.h;ii.i;jjj.j;kkk.k;lll.l;mmm.m; nnn.n;ooo.o;ppp.p;qqq.q;rrr.r;sss.s;'cr''lf' Where: aaa.a = P24V1 bbb.b = P24V2 (see Note) ccc.c = LNBVT (see **Note**) ddd.d = P13VT eee.e = P10V1 fff.f = A10V1 ggg.g = A10V2 (see Note) hhh.h = P7V8T iii.i = P5V8T jjj.j = P2V5T kkk.k = P1V2T lll.l = N5V8T mmm.m = FANR1 (see **Note**) mmm.m = FANR2 (see **Note**) nnn.n = BUCVT (see **Note**) ooo.o = FWPWR ppp.p = REFVT (see **Note**) qqq.q = LNBCS (see **Note**) rrr.r = ATEMP sss.s = OTEMP (see **Note**) **Note**: fields b, c, g, p, q are not used. **Note**: fields m and s are not used on PS1.	CMS=	CMS?	CMS=x....x (See description for details of arguments)
Set RTC (Real-Time-Clock) Date[E]	DAT=	6 bytes	Command or Query. A command in the form **mmddyy**, where; dd = day of the month, between 01 and 31, mm = month of the year, between 01 and 12 and yy = year, between 00 and 96 (2000 to 2096) **Example** (date = April 24, 2003): <1/DAT=042503'cr' >0001/DAT='cr''lf'	DAT= DAT? DAT*	DAT?	DAT=xxxxxx (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Set RTC (Real-Time-Clock) Date	DAY=	6 bytes	Command or Query. A command in the form **ddmmyy**, where; dd = day of the month, between 01 and 31, mm = month of the year, between 01 and 12 and yy = year, between 00 and 99 (2000 to 2099) **Example** (date = April 24, 2003): <1/DAY=240403'cr' >0001/DAY='cr''lf'	DAY= DAY? DAY*	DAY?	DAY=xxxxxx (Same format as command arguments)
Enable Statistics Averaging	ESA=	1 byte	Command or Query. Enables or Disables averaging of statistics data at a rate of once per second for 10 second. If Disabled, burst values will be logged instead of averaged values. 0 = Disable 1 = Enable **Example:** <1/ESA=0'cr' >0001/ESA='cr''lf' **Default Value:** 0	ESA= ESA? ESA*	ESA?	ESA=x (Same format as command arguments)
Retrieve Firmware Number	N/A		Query only Returns the firmware type(s) loaded into the unit. The firmware information is returned in the following format: FW-AAAAAAA B.B.BB DD/MM/YY Where: FW-AAAAAAA = the firmware part number B.B.BB = the version number DD/MM/YY = Day/Month/Year firmware released **Example:** <1/FRW?'cr' >0001/FRW= Boot: FW-0000082 0.0.1a 04/09/08 Bulk1: FW-0000078 0.0.1a 04/09/08 FW-0000080 0.0.1a 04/09/08 FW-0000081 0.0.1a 04/09/08 Bulk2: FW-0000078 0.0.1a 04/09/08 FW-0000080 0.0.1a 04/09/08 FW-0000081 0.0.1a 04/09/08	FRW=	FRW?	FRW={CR}Boot:{CR}abc{CR}Bulk1:{CR}abc{CR}abc (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Global Amplifier Configuration	GAC=	43 bytes	Command or Query. Used to set up and query the global status of the BUC/SSPA with a semicolon delimited string of data. **Example** (set GAC): GAC=aa.aa;b;ccccc;d;e;f;g;h'cr' Where: a = redundancy mode (ESW) b = online status (ONL) cc.cc = Attenuation Offset (AOF) dd.dd = Customer Attenuation(ATT) e = Auto Fault Recovery (AFR) fffff = Unit Alarm Mask (MSK) g = LNB Current Source (LCS) hh = LNB Current Window (LCW) i = LNB Current Window Enable (CWE) j = Enable Statistics Averaging (ESA) k = Set Statistics Interval (SSI) l = Enable Statistics Logging (ESL) m = Auxiliary Mute (AUX) n = user mute state (MUT) o = RF power amplifier state (AMP) Note: Fields A,B,C,G,H,I,L,M are not used.	GAC= GAC* GAC? GAC#	GAC?	GAC=x....x (See description for details of arguments)
Initialize Events Pointer	IEP=	None	Command only. Resets internal pointer to allow RNE? Queries to start at the beginning of the stored events log. **Example**: <1/IEP='cr' >0001/IEP='cr''lf'	IEP= IEP? IEP*	N/A	N/A
Software Image	IMG=	1 byte	Command or Query. Current Active software image, where: 1=Bulk Image # 1 currently active 2=Bulk Image # 2 currently active **Examples:** <1/IMG=1'cr' (instructs the unit to load firmware from image #1 at the next reset / power up). <1/IMG?'cr' (queries the image number that the firmware loaded during bootup) **Note**: if you send the IMG command, and then query the IMG value the numbers may not be equal because the command tells the firmware which image to boot from at the next bootup, and the query reports the image that the firmware booted from on the last bootup.	IMG= IMG? IMG* IMG#	IMG?	IMG=x (See description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
IP Address	IPA=	18 bytes	Command or Query. Used to set the IP address and network prefix for the 10/100 BaseT Ethernet management port, in the format: xxx.xxx.xxx.xxx.yy, where: xxx.xxx.xxx.xxx is the IP address, and yy is the network prefix (8-30) **Example:** <1/IPG=192.168.001.004.24'cr' >0001/IPG='cr''lf' **Note:** Changing the IP address through the Telnet interface requires the user to power cycle the unit, and then restart a new Telnet session with the new IP address. The IP address that you type into the Telnet client software does not include the range parameter so it would be: 192.168.1.4 **Default Value:** 192.168.001.004.24	IPA= IPA? IPA* IPA#	IPA?	IPA= xx.xxx.xxx.xxx.yy (See description of arguments)
Gateway Address	IPG=	15 bytes	Command or Query. Used to set the Gateway IP address for the 10/100 Base Tx Ethernet management port, in the format: xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx is the IP address **Example:** <1/IPG=192.168.001.005'cr' >0001/IPG='cr''lf' **Default Value:** 192.168.001.005	IPG= IPG? IPG*	IPG?	IPG = xxx.xxx.xxx.xxx
Initialize Statistics Pointer	ISP=	None	Command only. Resets internal pointer to allow RNS? Queries to start at the beginning of the stored statistics log. **Example:** <1/ISP='cr' >0001/ISP='cr''lf'	ISP= ISP? ISP*	N/A	N/A

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve next 5 unread Stored Alarms[E]	N/A	145 bytes	Query only. The unit returns the five oldest stored events in the alarm log, and if there are no events in the log the unit will reply with LNA*. All events that are read from the log are also automatically removed from the log. **Reply format:** YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr''lf' **Where:** YYYYYYYYYY is the fault description. ZZ is one of the event types listed below: FT = Fault OK = Clear IF = Information The rest of the string is a date / time stamp. **Example:** <1/LNA?'cr' >0001/LNA='cr' LOG CLR IF 175503 052307'cr' FAN #1 FT 175504 052307'cr' OVR TMP FT 175504 052307'cr' FAN #1 OK 175504 052307'cr' IIC BUS FT 175504 052307'cr''lf'	LNA=	LNA?	LNA=YY..ss (See description for details of arguments)
Low forward Power Threshold	LPT=	5 bytes	Command or Query. This command allows the user to set the threshold for the low forward power alarm/fault. If the forward power drops below the specified value, the alarm/fault will be indicated. Setting this parameter to 00.00 effectively disables the threshold **Example:** <1/LPT=00.00'cr' >0001LPT='cr''lf' **Default Value:** 00.00	LPT = LPT? LPT *	LPT?	LPT =xxx.x (Same format as command arguments)
Unit MAC Address	N/A	17 bytes	Query only. MAC address of the unit, reported in hexadecimal. **Example: <1/MAC?'cr'** **>0001/MAC=00-06-B0-00-D2-A7'cr''lf'**	MAC=	N/A	MAC=xx-xx-xx-xx-xx-xx (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Unit Alarm Mask	MSK=	5 bytes	Command or Query. Alarm mask conditions. If the mask value for a certain parameter is set to fault then a fault condition will be registered if specified hardware conditions are not met. If the mask value is set to alarm then a fault condition will only appear to be an alarm that will not trigger a switchover in a redundant system. If the mask value is set to masked then the fault will never be reported to the user. Form of: abcde Where: 0 = Fault, 1 = Alarm, 2 = Masked a = Low Forward RF Power b = External Reference Lock detect c = Fan Speed d = LNB Current Detect e = LNB 22V Power Supply **Example:** <1/MSK=2x1xx'cr' >0001/MSK=2x1xx'cr''lf' **Default Value:** 2x1xx	MSK= MSK? MSK*	MSK?	MSK=abcde (See description for details of arguments)
Mute State	MUT=	1 byte	Command or Query. Mute the unit, where: 0 = Disable (Not Muted) 1 = Enable (Muted) 2 = Unit muted due to HW mute signal. This value is only shown in the response to a query, and cannot be given as a command. When MUT returns a 2 it indicates that one of the "hardware" mute conditions is present. Additionally, certain faults can generate a hardware mute such as the BUC lock detect, If MUT returns an unexpected value of 2 then check the active faults, and the status of the auxiliary mute. **Example:** <1/MUT=1'cr' >0001/MUT=1'cr''lf' **Default Value:** 1	MUT= MUT? MUT*	MUT?	MUT=x (Same format as command arguments)
Number of Unread stored Events	N/A	3 bytes	Query only. Unit returns the Number of stored Events, which remain Unread in the form of xxx. **Example:** <1/NUE?'cr' >0001/NUE=126'cr''lf'	NUE=	NUE?	NUE=xxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Number of Unread stored Statistics	N/A	3 bytes	Query only. Unit returns the Number of stored Statistics, which remain Unread in the form of xxx. **Example:** NUS=126	NUS=	NUS?	NUS=xxx
Part Number	N/A	96 bytes alphanumeric	Query Only The PNM query will return the DOTCODE string that was loaded into the unit. Example: <1/PNM? >0001/PNM=HPODC0.350WRSW00'cr''lf'	PNM= PNM? PNM *	PNM?	PNM=x….x (see description for details of return string)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Alarm Status	N/A	168 bytes	Query only. Used to Query the Alarm status of the unit, where: OK = no fault condition, FT = faulted, AL = alarm, YS = Yes, NO = No, MS = masked. **Example:** <1/RAS?'cr' >0001/RAS='cr' P24V1=OK'cr' +24V power supply P24V2=NA'cr' +24V switch pwr supply LNBVT=NA'cr' +13/18V LNB power supply P13VT=OK'cr' +13.5V power supply P10V1=OK'cr' +10V power supply A10V1=OK'cr' +10V1 RF supply A10V2=NA'cr' +10V2 RF supply P7V8T=OK'cr' +7.8V power supply P5V8T=OK'cr' +5.8V power supply P2V5T=OK'cr' +2.5V power supply P1V2T=OK'cr' -1.2V power supply N5V8T=OK'cr' -5.8V power supply FANR1=OK'cr' Fan 1 speed FANR2=OK'cr' Fan 2 speed see Note. ATEMP=OK'cr' Amplifier temperature SHTDN=OK'cr' Over-temp shutdown IICST=OK'cr' I2C bus status FWPWR=OK'cr' Forward power in dBm CHKSM=OK'cr' Flash checksum FPGAD=NA'cr' FPGA done status BUCLD=OK'cr' BUC lock detect REFLD=NAcr' Reference lock detect LNBCS=NA'cr' LNB current status SWITC=NA'cr' Waveguide switch position status RDLNK=NA'cr' Redundant link status TRMST=YS'cr"If' Terminal Status **Note:** P24V2, LNBVT, A10V2, BUCLD, REFLD, LNBCS, SWITC and RDLNK are not used. **Note:** FAN2 is support on PS1.5 only.	RAS=	RAS?	RAS=x....x (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Reboot	RBT=	1 byte	Soft Reboot 1 = Reboot System	RBT = RBT? RBT*	N/A	RBT=x (See description for details of arguments)
Retrieve Configuration Status	N/A	45 bytes	Query only. Used to Query the configuration status of the unit **Examples:** RCS='cr' ATT=12.75'cr' AMP=1'cr' MUT=1'cr' ONL=1'cr' ESW=X'cr' AOF=XXXXX'cr' AFR=1'cr' XRF=N/A'cr''lf' (see **Note**) Where: ATT= attenuation in dB AMP= RF power amplifier state, 0=OFF, 1=ON MUT=RF mute state, 0=un-muted, 1=muted RED=Online status for redundancy ESW=Redundancy state and mode, states: 0=OFF, 1=ON Tx only, 2=ON Tx & Rx AOF=Attenuator Offset in dB AFR= auto fault recovery, 0=manual, 1=auto XRF = External reference status, N/A = no external reference, 05M for 5 MHz, and 10M for a 10 MHz **Note:** ONL,ESW,AOF,XRF are not used.	RCS=	RCS?	RCS=x....x (See description for details of arguments)
Retrieve Equipment Type[E]	N/A	22 bytes	Query only. The unit returns a string indicating the Model Number and the version of the M&C firmware installed in the unit. **Example:** <1/RET?'cr' >0001/RET=CPA-300 VER: 1.0.3'cr''lf'	RET=	RET?	RET=x....x (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
RF Power FET Current status	N/A	variable length depending on the number of FETs installed in the RF amplifier	Query only. Used to display all the FET currents. **Example:** <1/RFS? 'cr' >0001/RFS='cr' Q01=.xxx'cr' Q02=.xxx'cr' Q03=xx.x'cr' Q04=xx.x'cr' Q05=xx.x'cr' Q06=xx.x'cr' Q07=xx.x'cr' Q08=xx.x'cr' Q09=xx.x'cr' Q10=xx.x'cr' Q11=xx.x'cr' Q12=xx.x'cr' Q13=xx.x'cr' Q14=xx.x'cr' Q15=xx.x'cr' Q16=xx.x'cr''If' **Note:** If the value is one amp or greater the format is xx.x, and if the value is less than one amp then the format is .xxx	RFS=	RFS?	RFS=x….x (See description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Maintenance Status	N/A	213 bytes, alpha-numeric	Query only. Where: P24V1 = +24V power supply P24V2 = +24V switch power supply (see **Note**) LNBVT = +13/18V LNB power supply (see **Note**) P13VT = +13.5V power supply P10V1 = +10V1 power supply A10V1 = +10V1 on RF Module A10V2 = +10V2 on RF Module P7V8T = +7.8V power supply P5V8T = +5.8V power supply P2V5T = +2.5V power supply N1V2T = -1.2V power supply N5V8T = -5.8V power supply FANR1 = Fan 1 speed in percent FANR2 = Fan 2 speed in percent BUCVT = BUC tuning voltage (see **Note**) FWPWR = Forward power in dBm REFVT = Reference osc. tuning voltage (see **Note**) LNBCS = LNB current supply in mA (see **Note**) ATEMP = Heatsink temperature in Celsius OTEMP = Outside temperature in Celsius **Example:** <1/RMS?'cr' >0001/RMS='cr' P24V1=024.1'cr' P24V2=XXXXX'cr' LNBVT=XXXXX'cr' P13VT=013.4'cr' P10V1=010.1'cr' A10V1=010.1'cr' A10V2=XXXXX'cr' P7V8T=007.8'cr' P2V5T=002.5'cr' P1V2T=001.2'cr' N5V8T=-05.9'cr' FANR1=100.0'cr' FANR2=100.0'cr' (see Note). BUCVT=008.3'cr' FWPWR=+53.2'cr' REFVT=XXXXX'cr' LNBCS=XXXXX'cr' ATEMP=+40.0'cr' OTEMP=+30.0'cr' (see Note). **Note:** P24V2,LNBVT,A10V2,REFVT,LNBCS are not used **Note:** OTEMP, FANR2 are not support on PS1.	RMS=	RMS?	RMS=x....x (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Next 5 unread stored Events	N/A	75 bytes	Query only. Unit returns the oldest 5 Stored Events which have not yet been read over the remote control. Reply format: {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where Sub-body= ABCCddmmyyhhmmss: A being the fault/clear indicator. F=Fault C=Clear I=Info B being the fault type where: 1=Unit 2=RF 3=Log CC is Fault Code numbers, as in RAS? or Info Code, which is: 0=Power Off 1=Power On 2=Log Cleared 3=Global Config Change 4=Redundancy Config Change RAS fault codes map as follows: 1) P24V1 2) P13VT 3) A10V1 4) A10VPS 5) P5V8T 6) P2V5T 7) P1V2T 8) N5V8T 9) P7V8T 10) FANR1 11) FANR2 12) ATEMP 13) SHTDN 14) IICST 15) FWPWR 16) CHKSM 17) FPGAD 18) BUCLD If there are less than 5 events to be retrieved, the remaining positions are padded with zeros. If there are no new events, the response is RNE". A Global Config Change is defined as any time a command is successfully executed. A query does not set the status change flag. The status change flag is cleared after being read. No other events toggle a status change.	RNE=	RNE?	RNE={CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Next 5 unread stored Statistics	N/A	75 bytes	Query only. Unit returns the oldest 5 Stored Statistics entries which have not yet been read over the remote control. Reply format: {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where: Sub-body= ddmmyyhhmmssaaa.abbb.bccc.cdd.ddefghhh.hiii.i ddmmyy = day/month/year hhmmss = hour:minute:second aaa.a = Operating Temperature (I.E. +30.0) see Note bbb.b = Amp Temperature (I.E. +40.0) ccc.c = RF Power output dd.dd = Attenuation Setting e = Amp On/Off f = Mute On/Off g = Online/Offline Status see Note. hhh.h = LNB Current (mA) see Note. iii.i = BUC Tuning Voltage **Note:** fields g and h are not used. **Note:** field a not used in PS1. If there are less than 5 entries to be retrieved, the remaining positions are padded with zeros. If there are no new entries, the response is RNS*.	RNS=	RNS?	RNS={CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body (See description for details of arguments)
Serial Number	N/A	9 bytes	Query only. Used to Query the unit's 9 digit serial number in the form of RSN=xxxxxxxxx, where: xxxxxxxxx is the unit's 9-digit serial number. **Example:** <1/RSN?'cr' >0001/RSN=072282040'cr''lf'	RSN=	RSN?	RSN=xxxxxxxxx (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Summary Fault Status	N/A	1 byte	Query only. Indicates the condition of the summary fault. Where: 0 = Not Faulted (SumFLT_COM J6 pin K is not connected to SumFLT_NC J6 pin M) 1 = Faulted (SumFLT_COM J6 pin K is connected to SumFLT_NC J6 pin M) **Example:** <1/SFS? >0001/SFS=0'cr''lf' KEEP SFS	SFS=	SFS?	SFS=x (See description for details of arguments
Set FSK Address	SFA=	2 bytes, nuberic	Command or Query. Set FSK Address-between 01 to 15. **Example:** <1/SFA=01'cr' >0001/SFA='cr''lf' **Default Value:** 01	SFA = SFA? SFA*	SFA?	SFA=xx (See description for details of arguments)
SNMP Authentication Trap Enable	SNA=	1 byte	Command or Query. SNMP Authentication Trap Enable 0=Disabled 1=Enabled Example: <1/SNA=0	SNA= SNA?	SNA?	SNA=x (See description for details of arguments)
SNMP Enable	SNM=	1 byte	Command or Query. SNMP Enable. 0=Disabled 1=Enabled Example: <1/SNM=0	SNM= SNM?	SNM?	SNM=x (See description for details of arguments)
Serial Number	N/A	9 bytes	Query only. Used to Query the unit's nine-digit serial number in the form of SNO=xxxxxxxxx, where: xxxxxxxxx is the unit's nine-digit serial number. **Note:** this command is functionally identical to RSN. **Example:** <1/SNO?'cr' >0001/SNO=072282040'cr''lf'	SNO=	SNO?	SNO=xxxxxxxxx (See description for details of arguments)
Remote Address	SPA=	4 bytes	Command or Query. Set Physical Address-between 0001 to 9999. Resolution 0001 **Example:** <1/SPA=0412'cr' >0001/SPA='cr''lf' **Default Value:** 0001	SPA= SPA? SPA*	SPA?	SPA=xxxx (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
SNMP Read Community	SRC=	16 bytes, characters, no spaces	Command or Query. SNMP read community string. Empty string is not allowed Example: <1/SRC=public	SRC = SRC!	SRC?	SRC =x (see Description of Arguments))
SNMP System Contact	SSC=	255 bytes, characters,	Command or Query. SNMP System Contact string. Example: <1/SSC=Joe Net Admin. If not configured it returns empty string: <1/SSC=	SSC = SSC!	SSC?	SSC =x [1..128] (see Description of Arguments)
Set Statistics Interval	SSI=	2 bytes	Command or Query. Sets the interval at which statistics are logged. Minimum resolution is 1 minute, maximum is 99 minutes. **Example:** <1/SSI=90'cr' >0001/SSI='cr''lf' **Default Value:** 90	SSI= SSI?	SSI?	SSI=xx (Same format as command arguments)
SNMP System Location	SSL=	255 bytes, characters,	Command or Query. SNMP System Location string Example: <1/SSL=Upstairs back right. If not configured it returns empty string. <1/SSL=	SSL = SSL!	SSL?	SSL =x [1..128] (see Description of Arguments)
SNMP Unit Name	SSN=	16 bytes, characters,	Command or Query. SNMP System Name string Example: <1/SSN=Remote1. If not configured it returns empty string. <1/SSC=	SSN = SSN!	SSN?	SSN =x [1..128] (see Description of Arguments)
SNMP Trap Destination IP Address 1	STA=	15 bytes, Numerical	Command or Query. Used to set the IP address of the first SNMP Trap destination IP Address 1 where traps will be sent where the form xxx.xxx.xxx.xxx is the IP addresss Example: <1/STA=010.006.030.001 When not configured, returns >0001/STA=0.0.0.0	STA = STA!	STA?	STA=xxx.xxx.xxx.xxx (see Description of Arguments)
SNMP Trap Destination IP Address 2	STB=	15 bytes, Numerical	Command or Query. Used to set the IP address of the first SNMP Trap destination IP Address 2 where traps will be sent, in the form: xxx.xxx.xxx.xxx is the IP addresss Example: <1/STB=010.006.030.001 When not configured, returns >0001/STB=0.0.0.0	STB = STB!	STB?	STB=xxx.xxx.xxx.xxx (see Description of Arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
SNMP Trap Version	STV=	1 byte	Command or Query. SNMP Trap Version that will be used to send traps. 1=SNMP Trap Version 1 2=SNMP Trap Version 2 Example: <1/STV=0	STV = STV!	STV?	STV =x (see Description of Arguments)
SNMP Write Community	SWC=	16bytes, characters, no spaces	Command or Query. SNMP write community string. Empty string is not allowed Example: <1/SWC=private	SWC = SWC!	SWC?	SWC =x (see Description of Arguments)
Software Revision	N/A	34-37 bytes	Query only. Unit returns the value of the internal software revision installed in the unit, in the form: Boot:x.y.z Bulk1:x.y.z Bulk2:x.y.z -or- Boot:x.y.zz Bulk1:x.y.zz Bulk2:x.y.zz	SWR=	SWR?	SWR=Boot:x.y.zz Bulk1:x.y.zz Bulk2:x.y.zz (See Description of Arguments for details)
Set RTC Time	TIM=	6 bytes	Command or Query. A command in the form **hhmmss**, indicating the time from midnight, where hh = hours, between 00 and 23; mm = minutes, between 00 and 59, and ss = seconds, between 00 and 59 **Example** (time = 23 hours, 12 minutes and 59 seconds since midnight): <1/TIM=231259'cr' >0001/TIM='cr''lf'	TIM = TIM? TIM *	TIM?	TIM=xxxxxx (Same format as command arguments)
Temperature	N/A	5 bytes	Query only. Returns the temperatures of the Heatsink in the form of a sign byte followed by 4 bytes for the temperature. **Example:** TMP=+26.0	TMP=	TMP?	TMP=sxxx (See description for details of arguments)
Retrieve Number of unread Stored Alarms[E]	N/A	2 bytes	Query only. Returns the number of stored events, which remain unread in the alarm log. A maximum of 255 events may be stored in the alarm log. Numbers over 99 will be reported as 99. **Example reply:** <1/TNA? 'cr' >0001/TNA=14'cr''lf'	TNA=	TNA?	TNA=xx (See description for details of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Terminal Status Change	N/A	1 byte	Query only. Indicates if there has been a change in the configuration since the last time the command was given. A value of 0 indicates no status change, and a value of 1 indicates there has been a status change. A status change is defined as any time a parameter is changed. Such as when command is successfully executed that changes a value. A status change also results when there is a redundant switchover, or a fault condition. A query does not set the status change flag. The status change flag is cleared after being read. **Example:** <1/TSC?'cr' >0001/TSC=0'cr''lf'	TSC=	TSC?	TSC=x (See description for details of arguments)
Time Protocol Enable	TPE=	1 byte, numerical	Command or Query 0 = Time protocol disabled 1 = Time protocol enabled **Example:** TPE=1 (Time protocol enabled)	TPE= TPE?	TPE?	TPE=x (see description of arguments)
Time Protocol Server	TPS=	15 bytes, alpha-numeric	Used to set the Time Server IP address for the Unit. Tx Ethernet management port, in the format: xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx is the Time server IP address **Example:** TPS=192.168.001.005 **Default Value:** 255.255.255.255	TPS= TPS?	TPS?	TPS= xx.xxx.xxx.xxx.yy (see description of arguments)

1: While the underlying command will remain, the specific functionality will become obsolete, and should not be used for new implementations. There generally will be a different command elsewhere that encapsulates the marked functionality.

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PREFACE

About this Manual

This manual is applicable to LPOD-R units as listed:

- LPOD-R PS 1 and 1.5 units, all firmware versions.
- LPOD-R PS.5 units, firmware FW-0020841 and later.

Earlier LPOD-R PS 0.5 units with FW-0020765 are documented in the LPOD-R manual, revision 0.

This manual gives installation and operation information for the Comtech EF Data LPOD-R family of Outdoor Amplifiers / Block Up Converter (BUCs). This document is meant for anyone who installs or operates the LPOD-R.

Related Documents

- *Comtech EF Data CLC-10 Handheld Terminal M&C Accessory for LPOD or SPOD PS 1, PS 1.5, PS 2 User's Guide (CEFD P/N MN-CLC10)*
- *Comtech EF Data LPOD*net *M&C Netbook Accessory for LPOD or SPOD PS 1, PS 1.5, PS 2 Operation Manual (CEFD P/N MN-LPODNET)*

Disclaimer

Comtech EF Data has reviewed this manual thoroughly in order to provide an easy-to-use guide to this equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Further, Comtech EF Data reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

Contact Comtech EF Data Product Support if you have any questions regarding this equipment or the information in this manual.

Conventions and References

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

Warnings, Cautions, and Notes

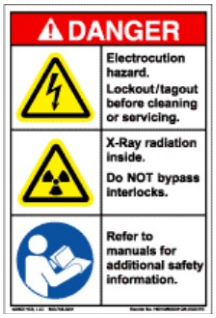
A **WARNING** informs you about a possible hazard that MAY CAUSE DEATH or SERIOUS INJURY.

A **CAUTION** informs you about a possible hazard that MAY CAUSE INJURY or PROPERTY DAMAGE.

A NOTE gives you important information about a task or the equipment.

A REFERENCE directs you to additional information about a task or the equipment.

Examples of Multi-Hazard Notices


DANGER
Electrocution hazard. Lockout/tagout before cleaning or servicing.
X-Ray radiation inside. Do NOT bypass interlocks.
Refer to manuals for additional safety information.

DANGER
Electrocution hazard. Lockout/tagout before cleaning or servicing.
X-Ray radiation inside. Do NOT bypass interlocks.
Refer to manuals for additional safety information.

Recommended Standard Designations

The new designation of the Electronic Industries Association (EIA) supersedes the Recommended Standard (RS) designations. References to the old designations may be shown when depicting actual text (e.g., RS-232) displayed on the physical product, LPOD-R Web Server pages or optional serial remote interface. All other references in the manual refer to EIA designations.

Electrical Safety Notice

CAUTION – Neutral Fusing – Double pole/neutral fusing is used on the prime power supply input.

This equipment has been designed to minimize exposure of personnel to hazards. For further information, contact Comtech EF Data, Customer Support Department. The operators and technicians must:

- Know how to work around, with, and on high voltage equipment.
- Exercise every precaution to ensure personnel safety.
- Exercise extreme care when working near high voltages.
- Be familiar with the warnings presented in this manual.

Installation Guidelines Regarding Power Line Quality

Comtech EF Data has become familiar with the varying quality of the AC power grid around the world. Observing the following installation guidelines should help ensure a reliable installation.

- **Surge suppression:** High voltage surges can cause failure of the power supply. These surges are typically caused by circuit switching on the main AC power grid, erratic generator operation, and also by lightning strikes. While the LPOD-R does have built in surge suppression, if the unit is to be installed in a location with questionable power grid quality, Comtech EF Data recommends installation of additional power conditioning/surge suppression at the power junction box.

- **Grounding:** The LPOD-R provides a grounding terminal. This is provided to allow you to ground the LPOD-R to the antenna's grounding network. All components installed at the antenna should be grounded to a common grounding point at the antenna.

- **Electrical welding:** If welding needs to take place at the antenna, disconnect all cables from the LPOD-R except for the ground wire. Cap all RF connections with terminations. This will prevent damage to the input/output circuitry of the LPOD-R.

- **Lightning:** Lightning strikes on or around the antenna will generate extremely high voltages on all cables connected to the LPOD-R. Depending on the severity of the strike, the LPOD-R's internal surge protection combined with the recommended external suppression may protect the LPOD-R's power supply. However, if the installation will be in an area with a high probability of lightning strikes, Comtech EF Data recommends the installation of surge suppression on the RF and IF cables. One source of these suppressors is PolyPhaser (www.polyphaser.com).

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

http://www.comtechefdata.com

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

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Chapter 1. INTRODUCTION

1.1 Overview

Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) – referred to collectively throughout this manual as the LPOD-R – deliver rated power, guaranteed, to the transmit waveguide flange at the 1 dB compression point. The LPOD-R is a cost-effective alternative for the LPOD, where the full LPOD's support of internal 10 M Hz and redundancy is not required.

LPOD-R PS .5 LPOD-R PS 1 LPOD-R PS 1.5

Figure 1-1. Comtech EF Data LPOD-R Outdoor Amplifiers / BUCs

1.2 Functional Description

The LPOD-R serves as a more reliable replacement for Traveling Wave Tube (TWT) amplifiers in satellite communications. The compact size and weight of the LPOD-R lends itself to any installation with limited available mounting space. This includes ship-borne antenna systems, small "flyaway" systems, and Satellite News Gathering (SNG) installations.

As shown in Figure 1-1, Comtech EF Data's LPOD-R is available in three models: the PS .5, PS 1, and PS 1.5. Each LPOD-R consists of a CEFD SSPA module with the Monitor/Control Processor (MCP), a power supply, and a fan assembly. The amplifier features a Comtech EF Data low loss combining technique and MCP-based temperature-versus-gain compensation.

1.3 Features

1.3.1 The Solid-State Advantage

Comtech EF Data's extensive experience in the design of outdoor RF transceivers led to the LPOD-R family's efficient thermal and mechanical package. The LPOD-R is constructed with highly reliable gallium arsenide field-effect transistors (GaAs FETs). With third-order intermodulation products that are 4 to 6 dB better than TWT ratings, the CEFD unit replaces TWTs with saturated power levels of up to twice the LPOD-R's rated output. The LPOD-R also provides mean time between failures (MTBF) that is four to five times greater than the typical TWT MTBF.

1.3.2 "Smart BUC" Functionality

The LPOD-R offers full 13.75 to 14.5 GHz Ku-Band and 5850 to 6725 MHz C-Band coverage while supporting industry standard FSK modem/BUC communications, as well as Comtech EF Data proprietary commands.

1.3.3 Enhanced Standard Features

The LPOD-R comes equipped with useful features that other manufacturers offer only as options. Included in the base price are temperature compensation, power monitor, power factor corrected supply, and full remote monitor and control (M&C) capabilities (including Ethernet, FSK, and Comtech's proprietary Advanced FSK).

1.3.3.1 Advanced FSK

The LPOD-R, when used with Comtech EF Data modems, provides enhanced functionality utilizing the industry standard FSK communications channel. Advanced FSK offers full control of single thread and, where applicable, redundant systems from the modem front panel, without additional cabling or cost. Additionally, access the LPOD-R via the Ethernet M&C port of the modem, and control it via Embedded Distant-end Monitor and Control (EDMAC).

1.3.3.2 Data Logging Capability

To enhance system maintainability, the LPOD-R includes a built-in data logging capability. By recording critical operational parameters such as temperature, output power, mute status, etc. at time stamped intervals, you can quickly gather intelligence about not only the unit itself but also the unit's operational environment.

1.3.3.3 Hand-Held Controller Devices

The LPOD-R accommodates a variety of hand-held controller devices. These include the LPODnet M&C Accessory Kit and the CLC-10 M&C Accessory Kit. Both are designed to access the monitor and control functionality of the LPOD-R.

1.4 Theory of Operation

1.4.1 SSPA Block Diagrams

See Figure 1-2 for the LPOD-R block diagram. The major components of an LPOD-R unit are:

- SSPA Module
- Cooling System
- Monitor and Control (M&C)
- Power Factor Corrected Power Supply (PS 1 and PS 1.5 packages)

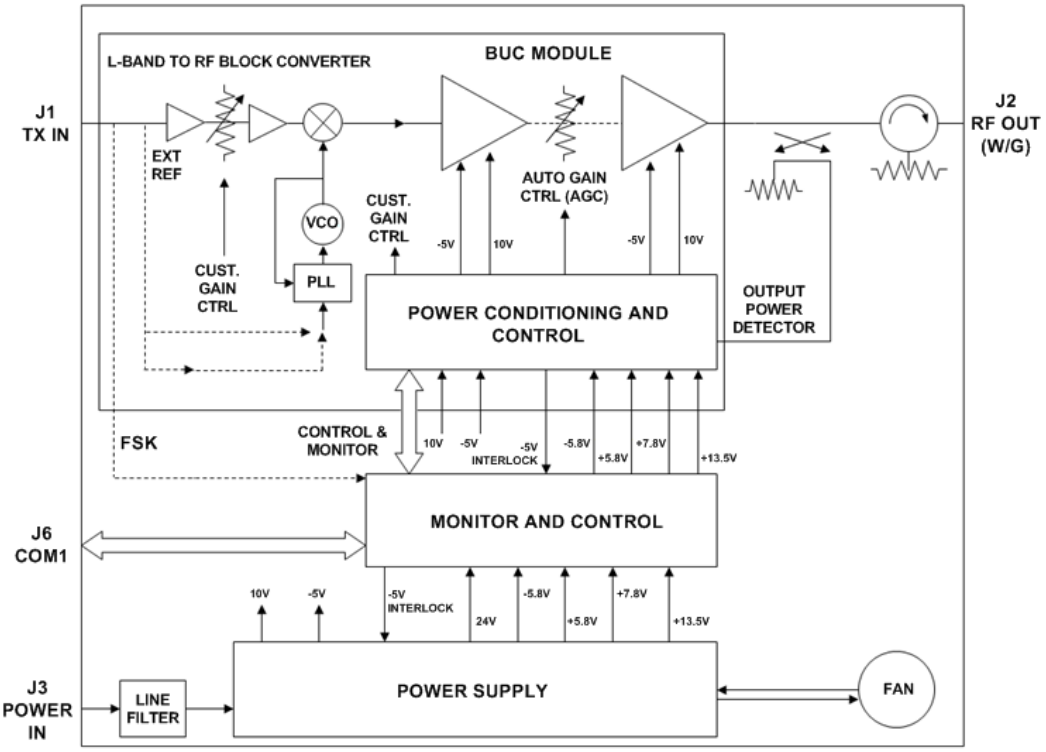


Figure 1-2. LPOD-R Typical Block Diagram

1.4.2 SSPA Module

The amplifier module performs the core function of the unit. An isolator is at the RF input to ensure good voltage standing wave ratio (VSWR). The RF signal then passes through an electronically controlled attenuator that adjusts the overall attenuation according to the user input. After some amplification, a second attenuator is automatically controlled via a look-up table to maintain the amplifier gain at a constant level over temperature variations.

The RF signal is then amplified by a multi-stage design that utilizes proprietary combining techniques to meet the rated power requirements. The output circuitry contains a coupler to provide a sampled signal for monitoring purposes. A power detector circuit also is included and the reading can be accessed via remote communication. A high power circulator and load is located at the output to provide good VSWR and protection from external mismatch.

1.4.3 Cooling System

The PS .5 contains a single fan that is always enabled. The PS 1 contains one temperature-controlled fan, and the PS 1.5 contains two temperature-controlled fans.

1.4.4 Monitor and Control (M&C)

The LPOD-R includes a microprocessor-based system that provides monitoring and control of the essential parameters of the unit. You interface with the unit through the M&C system via the remote control/discrete communications port. The unit is capable of Ethernet remote communication, while EIA-232/485 is optional on the PS 1 and PS 1.5 packages. A discrete mute control and relay status output is also available on the PS 1 and PS 1.5 packages.

The M&C system monitors the fan speed, unit temperature, all power supply voltages, power transistor currents, output power, etc. Should a critical monitored parameter fail, the unit will mute the RF signal and report a fault. The details of the fault can be accessed via remote communication.

The LPOD-R PS .5 features a Light-Emitting Diode (LED) Indicator. Figure 1-3 shows the location of this feature, on the signal output side of the LPOD-R PS .5 housing, next to the ground lug. This LED provides you with visual cues to the operational, online, and offline status of the system. See Chapter 2 for complete details about interpreting LED operation.

Figure 1-3. LPOD-R PS .5 LED Indicator

1.4.5 Power Supply

The LPOD-R features a power supply that is power factor corrected. It supplies several voltages necessary for the unit to operate:

The 10V power supply output state is controlled by circuitry within the RF module. If the RF module does not have the –5.8V supply for any reason, it will not allow the 10V power supply to turn on. This protects the power transistors within the RF module from failure due to improper power supply sequencing.

The +24V output powers the cooling fans, is the source of power for waveguide switching when the SSPA is used in redundant configurations, and is dropped to +22V for LNB bias.

The +5.8V, -5.8V, +7.8V and +13.5V outputs are used to operate the M&C board and other overhead functions.

1.4.6 Block Up Converter (BUC) Input

The LPOD-R translates an L-Band input carrier to the desired output frequency (C-, X-, or Ku-Band). LO frequencies are as follows:

BUC C, Ku, X LO Frequencies			
Band	**Frequency**	**LO Frequency**	**Inverting**
C-Band	5850 to 6650 MHz	4900 MHz	No
	5950 to 6700 MHz	5000 MHz	No
Insat C-Band	6725 to 7025 MHz	5760 MHz	No
Ku-Band	14.00 to 14.50 GHz	13.050 GHz	No
Ku-Band-W	13.75 to 14.50 GHz	12.800 GHz	No
X-Band	7900 to 8400 MHz	6950 MHz	No

1.5 Summary of Specifications

1.5.1 Characteristics

IF Input Frequency [Note 1]	RF Output Frequency
950 – 1525 MHz	5.850 – 6.425 GHz
950 – 1750 MHz	5.850 – 6.650 GHz (optional)
950 – 1825 MHz	5.850 – 6.725 GHz (optional)
965 – 1265 MHz	6.725 – 7.025 GHz
950 – 1450 MHz	7.900 – 8.400 GHz
950 – 1450 MHz	14.00 – 14.50 GHz
950 – 1750 MHz	13.75 – 14.50 GHz (optional)

Model		Psat (Typical)	P1dB (Guaranteed) [Note 1]
Ku-Band Units	PS.5-10Ku	40 dBm (10 W)	39 dBm (8 W)
	PS.5-15Ku	42 dBm (16 W)	40.75 dBm (12 W)
	PS1-20Ku	43 dBm (20 W)	42 dBm (16 W)
	PS1-32Ku	45 dBm (32 W)	44 dBm (25 W)
	PS1-40Ku	46 dBm (40 W)	45 dBm (25 W)
	PS1.5-50Ku	47 dBm (50 W)	46 dBm (40 W)
	PS1.5-60Ku	48 dBm (60 W)	47 dBm (50 W)
C-Band and/or X-Band Units	PS.5-15C	41 dBm (15 W)	40 dBm (10 W)
	PS1-25C,X	44 dBm (25 W)	43 dBm (20 W)
	PS1-32C,X	45 dBm (32 W)	44 dBm (25 W)
	PS1-40C,X	46 dBm (40 W)	45 dBm (32 W)
	PS1-50C,X	47 dBm (50 W)	46 dBm (40 W)
	PS1-60 C,X	48 dBm (60 W)	47 dBm (50 W)
	PS1.5-75 C,X	48.6 dBm (75 W)	48 dBm (60 W)
	PS1.5-80 C,X	49 dBm (80 W)	48.5 dBm (70 W)
	PS1.5-100 C,X	50 dBm (100 W)	49 dBm (80 W)
	PS1.5-110 C,X	50.4 dBm (110 W)	49.5 dBm (90 W)
	PS1.5-125 C,X	51 dBm (125 W)	50 dBm (100 W)

Notes:

1. Allow 1 dB degradation from 13.75 to 14.0 GHz and 6425 to 6725 MHz.

Gain Min (Typical)	PS .5	60 (65 dB)
	PS 1, 1.5	70 (75dB)
Input Power Supply Requirements		90-264 VAC, 47-63 Hz, Power Factor Corrected, .96 (PS 1, 1.5 only)(48 VDC optional)
Max IF Input level (no damage)		+10 dBm

Gain Adjust	PS .5	10 dB in 0.25 dB steps
	PS 1, 1.5	20 dB in 0.25 dB steps
Gain Flatness		±1.5 dB full band (optional ±2.0 dB full band (-50° to +55°C)) ±0.40 dB per 40 MHz (optional ±0.50 dB per 40 MHz (-50° to +55°C))
Gain variation over temp		±1.5 dB max, -40° to +55°C (optional ±2.0 dB max (-50° to +55°C))
Input Return Loss		14 dB (1.5:1 VSWR)
Output Return Loss		17.7 dB (1.3:1 VSWR)
Noise Figure		15 dB typical, 20 dB max @ min attenuation
RF Mute Isolation		-60 dBc min
AM/PM Conversion		2° typical, 3.5° max @ Rated P1dB output power
Third-order Intermodulation Level (2 tones, @ -3 dB Total Backoff from P1 dB (-6 dBc SCL), Δ 1MHz)		-30 dBc typ., -25 dBc Guaranteed
Spurious Level	Harmonics	-50 dBc @ Prated – 3 dB
	Carrier Related In-band	-60 dBc min @ P1dB
	Non-Carrier Related In-band	-60 dBm max (Input Terminated)
	LO Leakage	-25 dBm max
Group delay variation	Linear	± 0.03 ns/MHz
	Parabolic	±0 .003 ns/MHz^2
	Ripple	± 1.0 ns pk-pk
Data Logging Parameters		Non-Volatile RAM: Capacity 30 days @ 90-minute intervals. Includes: RF Output Power Mute Status Heatsink Temperature

Phase Noise (dBc/Hz) (with optional internal or equivalent performance external reference)		Typical (C/X/Ku) dBc/Hz	Spec (C/X/Ku) dBc/Hz
Offset	100 Hz	-65	-62
	1 KHz	-75	-72
	10 KHz	-85	-82
	100 KHz	-95	-92
	1 MHz	-105	-102

1.5.2 Environmental

Temperature	Operating	Standard	-40º to 122ºF (-40º to 55ºC)
		Optional	-58º to 131ºF (-50º to 55ºC) or -40º to 140ºF (-40º to 60ºC)
	Storage		-67º to 167ºF (-55º to 75ºC)
Humidity			100% condensing rain 2" per hour
Altitude			10,000 AMSL
Shock			Normal commercial shipping and handling

1.5.3 Physical

Weight	PS .5		5 lbs. (2.3 kg) Nominal
	PS 1		17 lbs. (9.1 kg) Nominal
	PS1.5		
Dimensions (excluding connectors) See Section 1.6.	PS .5		7.21 x 4.65 x 3.34 in. (183.1 x 118.1 x 84.8 mm)
	PS 1		12.60 x 6.31 x 6.05 in. (320.0 x 160.3 x 153.7 mm)
	PS 1.5		12.78 x 6.14 x 6.47 in. (324.6 x 155.9 x 164.3 mm)
Connectors	IF/RF Input		Type 'N' Female
	RF Output	PS .5	C-Band: CPR137G Ku-Band: WR75G
		PS 1	C-Band: Type 'N' Female (optional CPR137G) X-Band: CPR112G Ku-Band: WR75G
		PS 1.5	C-Band: CPR137G X-Band: CPR112G Ku-Band: WR75G
	M&C (Ethernet)	PS .5	Weatherized RJ-45
		PS 1	Optional 19-pin MS style (single integrated cable assembly available, dependent upon configuration)
		PS 1.5	

1.6 Dimensional Envelopes

Typical for all figures in each subsection, all dimensions are in inches. Bracketed dimensions, where shown, are in metric units (mm).

1.6.1 LPOD-R PS .5 Dimensional Envelopes

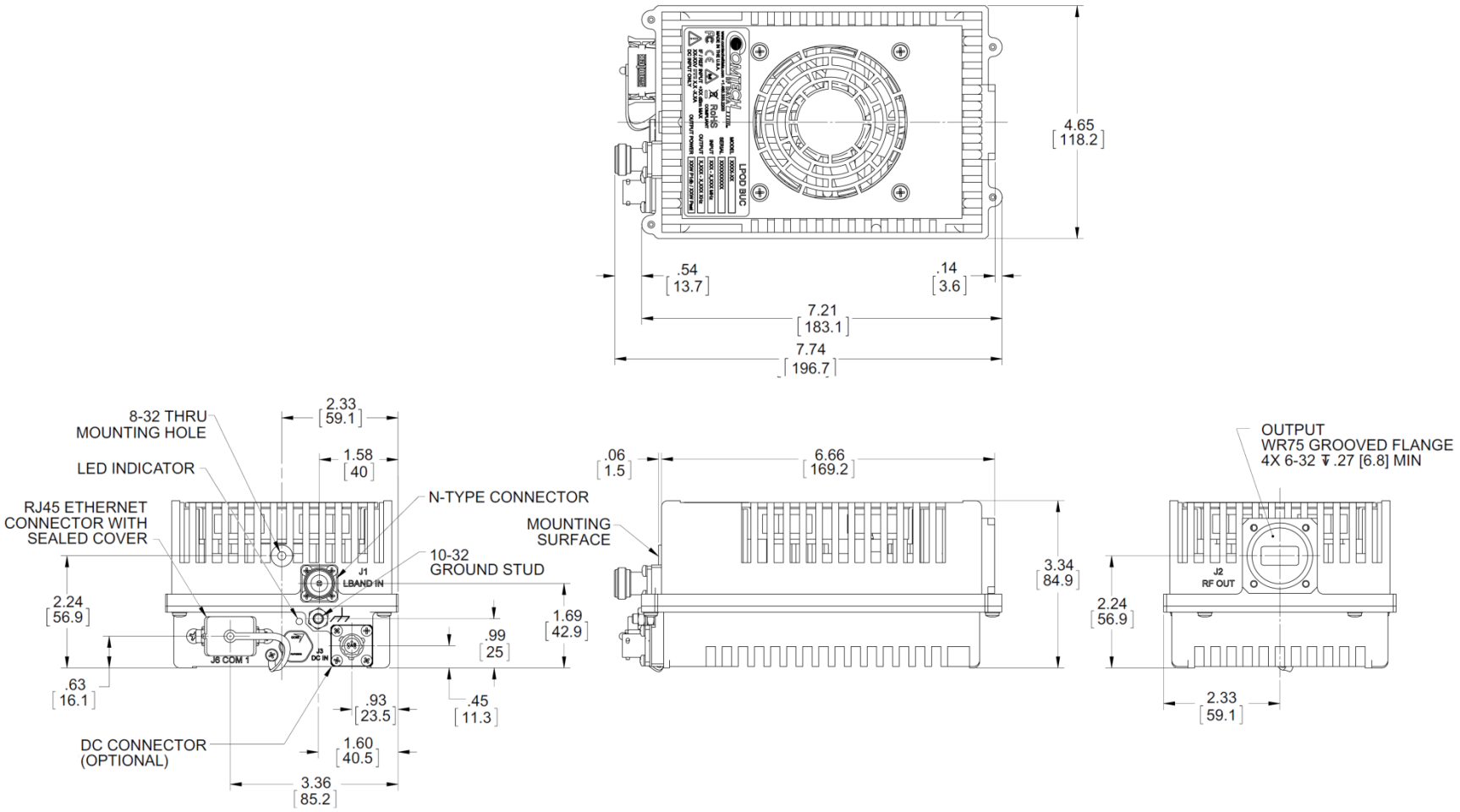


Figure 1-4. LPOD-R PS .5 Ku-Band Unit – DC Power, Waveguide Output

1.6.2 LPOD-R PS 1 Dimensional Envelopes

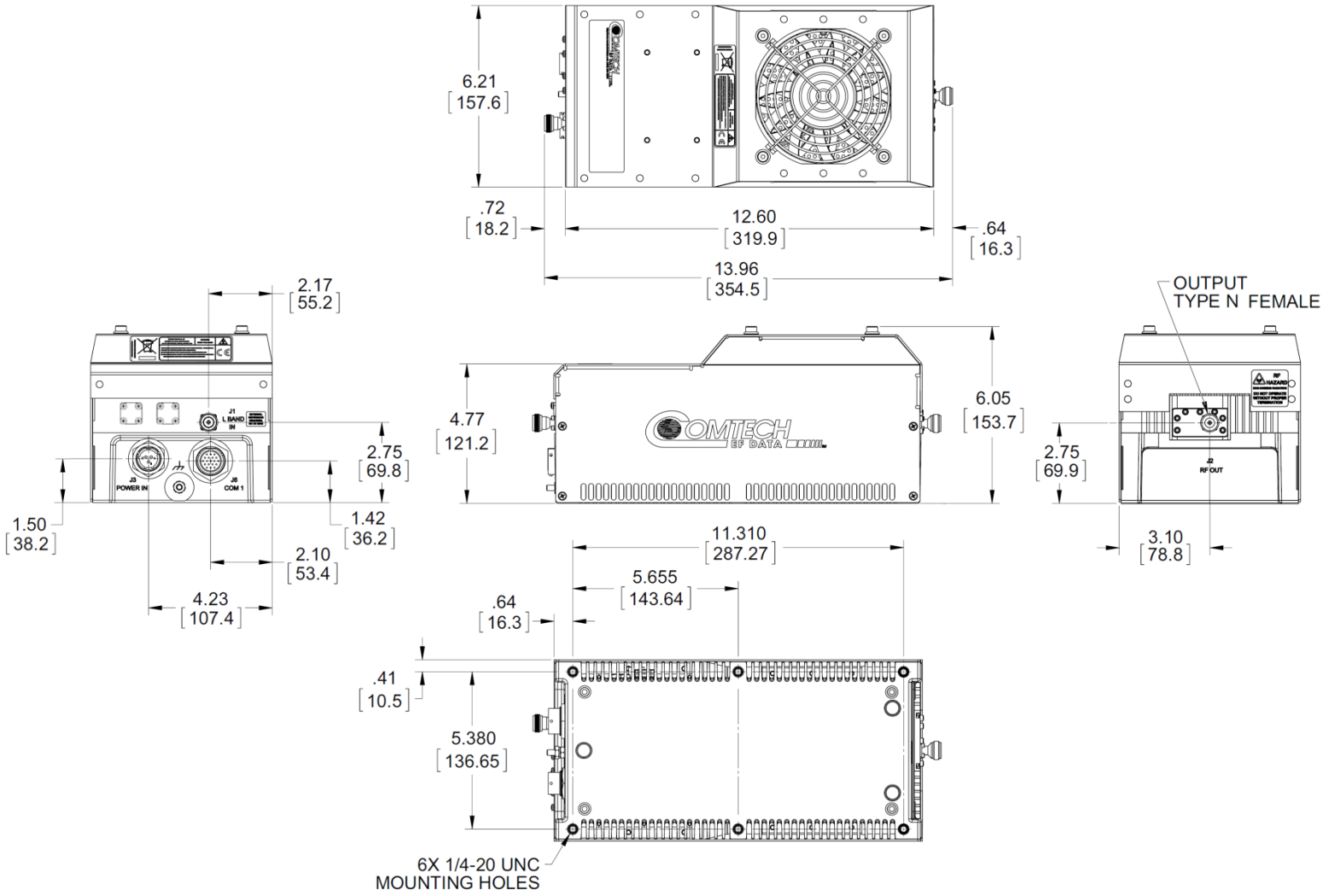


Figure 1-5. LPOD-R PS 1 C-Band Unit – AC Power, Coaxial Output (FUTURE)

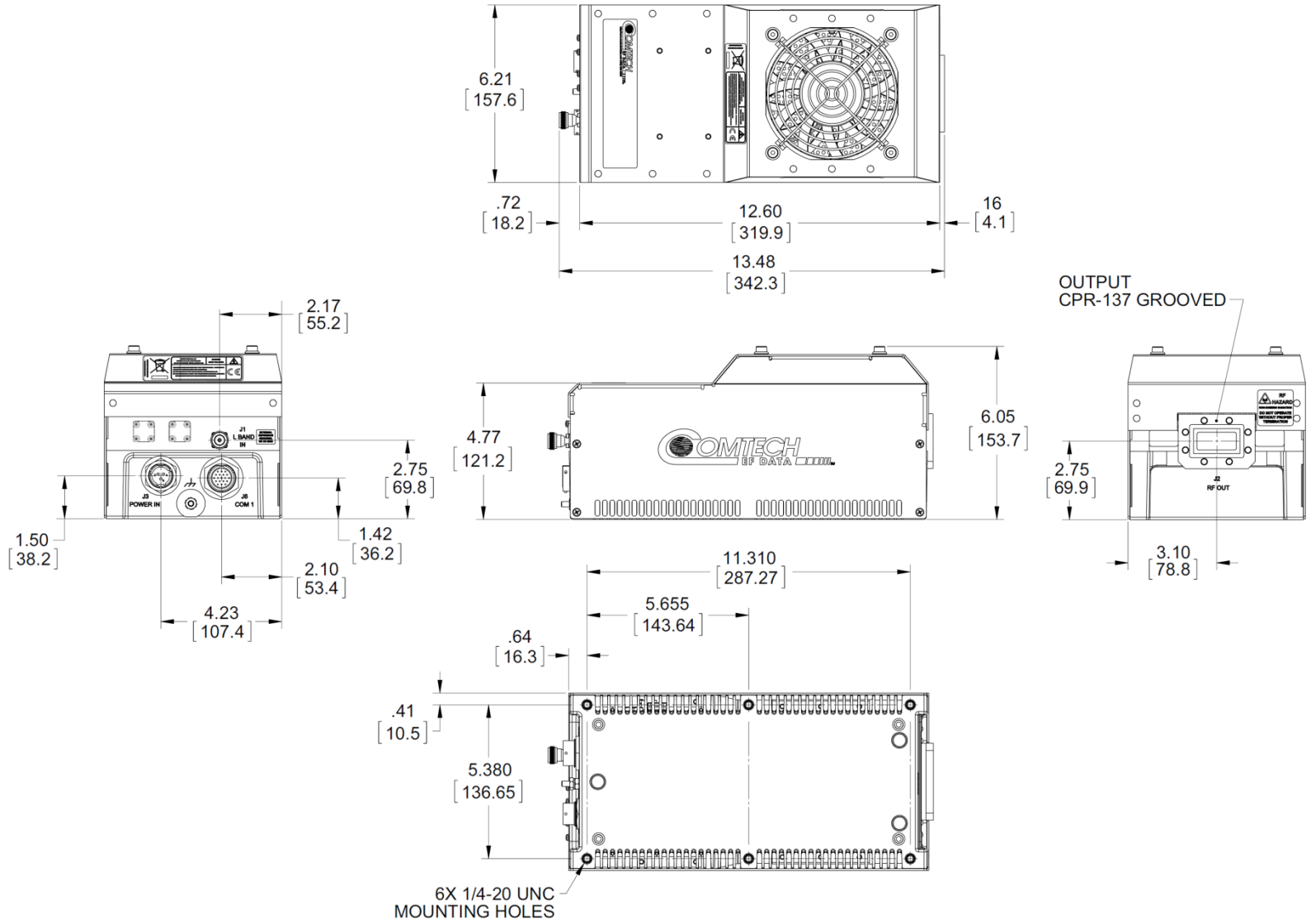


Figure 1-6. LPOD-R PS 1 C-Band Unit – AC Power, Waveguide Output (FUTURE)

1.6.3 LPOD-R PS 1.5 Dimensional Envelopes

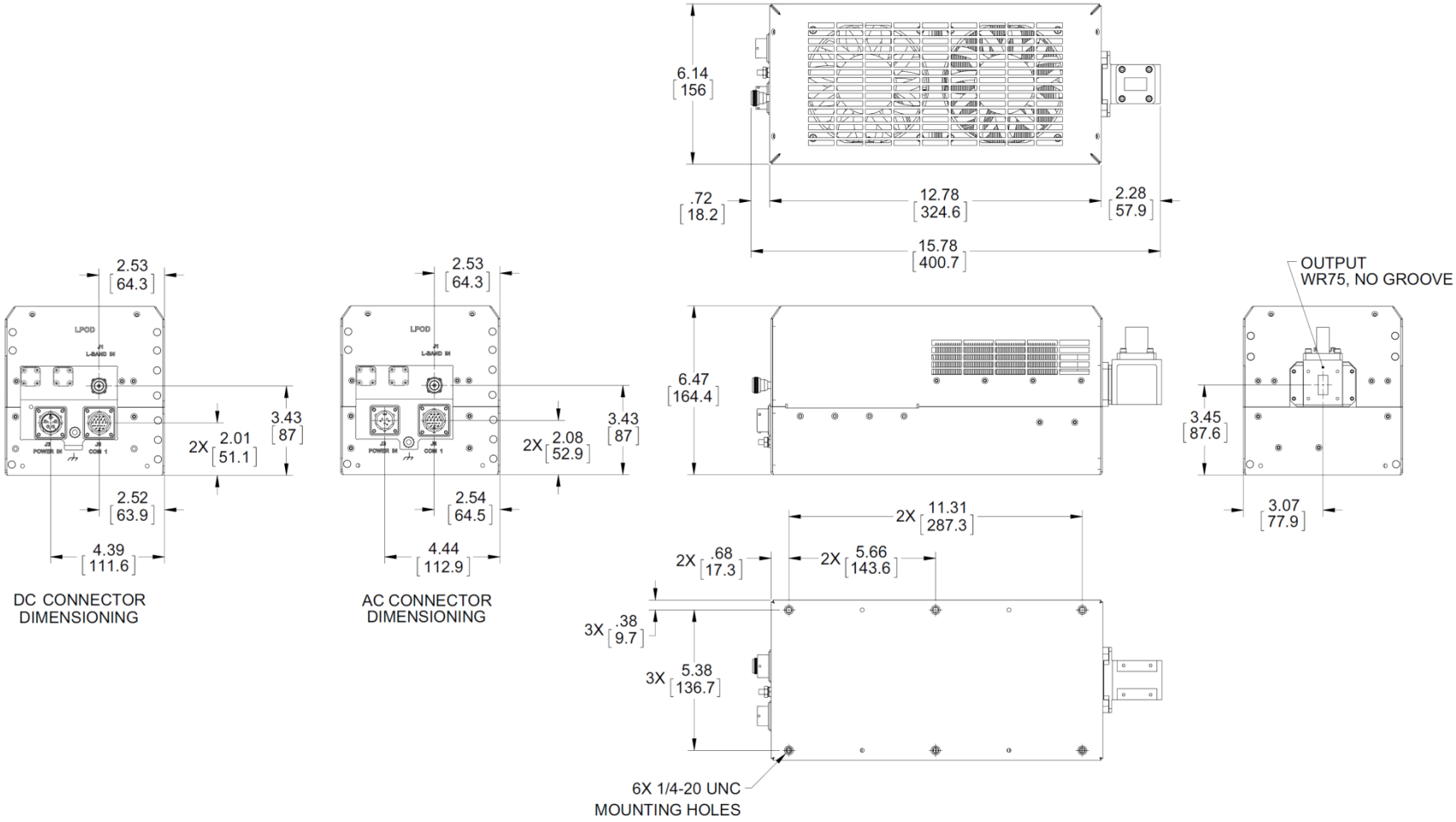


Figure 1-7. LPOD-R PS 1.5 Ku-Band Unit – AC or DC Power, Waveguide Output (FUTURE)

Chapter 2. SYSTEM CONNECTIONS, INSTALLATION AND STARTUP

2.1 Overview

This chapter summarizes the connectors provided for all necessary external connections between the LPOD-R PS .5 (Figure 2-1), PS 1 (Figure 2-2), or PS 1.5 (Figure 2-3) models and other equipment.

Basic installation and operational startup information is provided in Sect. 2.3. For a detailed overview on the LPOD-Rs operability, see Chapter 4. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT or Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT (for EIA-232/485 remote M&C commands and/or queries).

Figure 2-1. LPOD-R PS .5 Connectors

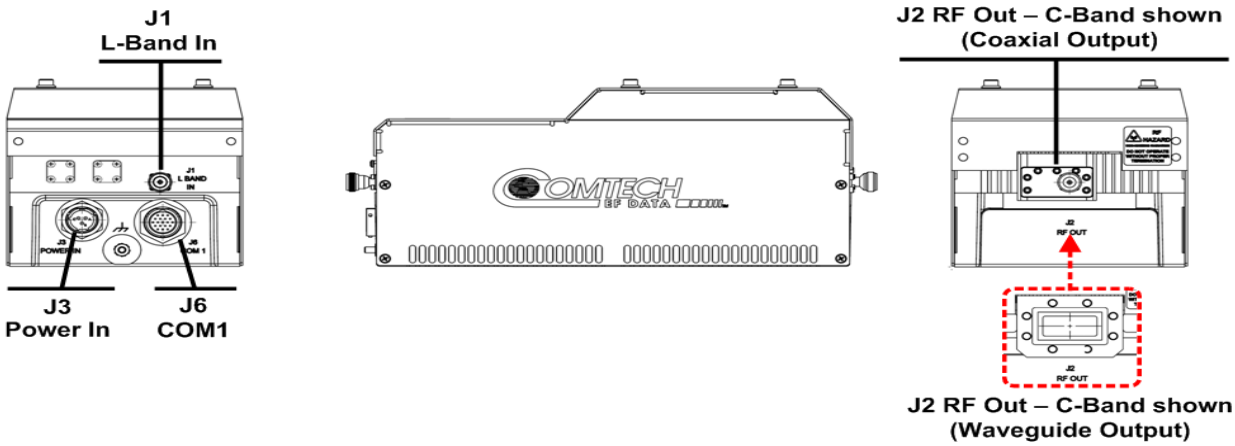


Figure 2-2. LPOD-R PS 1 Connectors

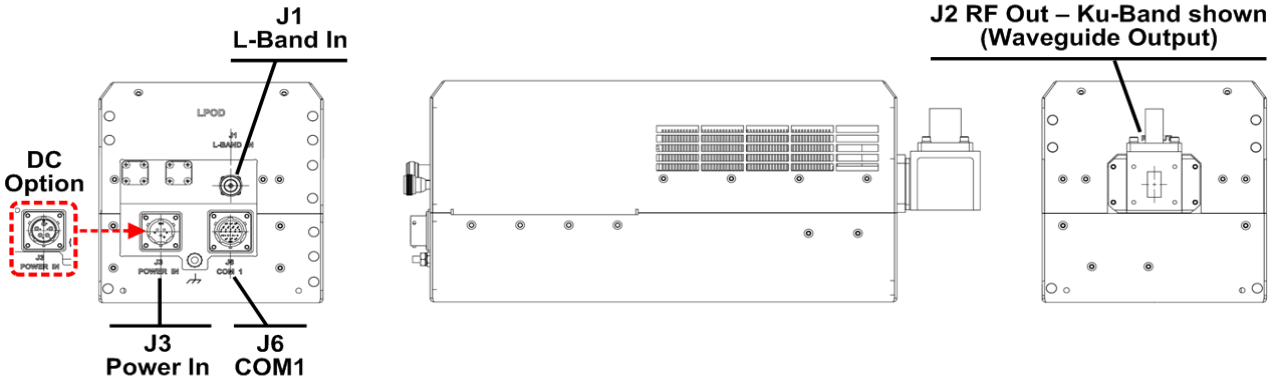


Figure 2-3. LPOD-R PS 1.5 Connectors

2.2 Interface Connectors

2.2.1 Connector J1 | LBAND IN

The **J1 | LBAND IN** RF input connector is a Type N female connector. Typical input levels (-30 dBm) depend on desired output power and unit attenuation. To prevent damage to the LPOD-R, RF input levels must not exceed +15 dBm.

2.2.2 Connector J2 | RF OUT

WARNING

For safety reasons, never look directly into the waveguide output.

The J2 | RF OUT connector may be a waveguide or coaxial interface – the type of interface used depends on the LPOD-R model and/or frequency range of the unit, as described in Table 2-1 and as shown in Figures 2-1, 2-2, and 2-3.

Table 2-1. J2 | RF OUT Interface Type

Unit	Frequency / Output Type	Figure
PS .5	C-Band: CPR137G Ku-Band: WR75G	Figure 2-1
PS 1	C-Band: Type N Female (optional CPR137G) X-Band: CPR112G Ku-Band: WR75G	Figure 2-2
PS 1.5	C-Band: CPR137G X-Band: CPR112G Ku-Band: WR75G	Figure 2-3

2.2.3 Connector J3 | POWER IN AC Power Mains

WARNING

For safety reasons, make sure you know that the J3 AC Power Connection pin assignments for each LPOD-R model are different. You must use the correct pin assignments.

Use of incorrect pin assignments can result in product damage or personal injury.

For any AC-powered LPOD-R product, the prime power input requirement is as follows:

- 90-264 VAC

- 47 to 63 Hz

The power supply is power factor corrected. The total power required from the prime power supply depends on the model used. Please refer to Sect. 1.5 Summary of Specifications.

2.2.3.1 LPOD-R PS 1, PS 1.5 J3 | POWER IN AC Power Main

The mating connector specification and pin assignments (Table 2-2) unique to the LPOD-R PS 1 and PS 1.5 AC power interfaces are as follows:

Mating Connector: CEFD P/N CN/MS-STPG03F02 (ITT Cannon KPT06B-12-35)

Table 2-2. LPOD-R PS 1/PS 1.5 J3 | POWER IN Pin Assignments

Pin	Description
A	LINE (L1)
B	NEUTRAL (L2)
C	GND

2.2.4 Connector J3 | POWER IN Optional DC Power Mains

WARNING

For safety reasons, make sure you know that the J3 AC Power Connection pin assignments for each LPOD-R model are different. You must use the correct pin assignments.

Use of incorrect pin assignments can result in product damage or personal injury.

For all LPOD-R models, the prime power input requirement is 36-72 VDC. The total power required from the prime power supply depends on the model used. See Sect. 1.5 Summary of Specifications for more information.

2.2.4.1 LPOD-R PS .5 J3 | POWER IN DC Power Main Option

The mating connector specification and pin assignments (Table 2-3) unique to the LPOD-R PS .5 optional DC power interface are as follows:

Mating Connector: CEFD P/N CN-0020708 (SOURIAU UTS6JC8E33S)

Table 2-3. LPOD-R PS 1 J3 | POWER IN Pin Assignments

Pin	LPOD-R PS .5 Assignment
A	V+
B	V-
C	GND (chassis ground)

2.2.4.2 LPOD-R PS 1 J3 | POWER IN DC Power Main Option

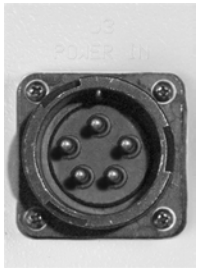
The mating connector specification and the pin assignments (Table 2-4) unique to the LPOD-R PS 1 DC power interface are as follows:

Mating Connector: CEFD P/N CN/STPG04F01 (Glenair IPT06E-12-4-SSR-F7)

Table 2-4. LPOD-R PS 1 J3 | POWER IN Pin Assignments

Pin	LPOD-R PS 1 Assignment
A	V+
B	GND
C	V-
D	NO CONNECT

2.2.4.3 LPOD-R PS 1.5 J3 | POWER IN DC Power Main Option



The mating connector specification and the pin assignments (Table 2-5) unique to the LPOD-R PS 1.5 DC power interface are as follows:

Mating Connector: CEFD P/N CN-0020517 (MS3116E-14-5S(476), Amphenol PT06E-14-5S(476))

Table 2-5. LPOD-R PS 1.5 J3 | POWER IN Pin Assignments

Pin	LPOD-R PS 1.5 Assignment
A	+48V
B	+48V
C	-48V
D	-48V
E	GND

2.2.5 Connector J6 | COM1 (Remote Communications and Discrete Control Port – PS 1, PS 1.5 ONLY)

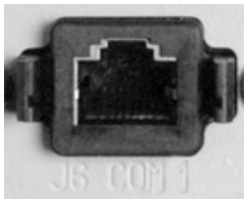
The J6 | COM 1 discrete control connector is the primary input for controlling and monitoring the LPOD-R PS1 and 1.5. It is a 19-pin circular connector, type MS3112E14-19S, used for both standard Ethernet M&C (with use of a 19-pin to RJ-45 adapter cable) or optional EIA-232/485 Serial M&C. The pinout specification is contained in Table 2-6

Mating connector: ITT: KPT06J14-19P or MS3116J14-19P

Table 2-6. LPOD-R J6 | COM1 Pin Assignments

Pin	Name	Description
A	RS485_+RX	
B	RS485_-RX	
C	RS485_+TX	
D	RS485_-TX	
E	RS232_RD	Pin 3 of DB9 female connector
F	Ethernet TX+	Pin 3 of RJ45 female connector
G	RS232_TD	Pin 2 of DB9 female connector
H	Ethernet TX-	Pin 6 of RJ45 female connector
J	TX/RX Switch Drive 1 Pos	Not for customer use
K	Gnd	Ground (also Pin 5 of DB-9F connector)
L	SUMFLT In	Open when faulted, else +5VDC
M	SUMFLT Out	When faulted, tied to Pin K, else open
N	TX Switch Pos 1 Ind	Online/Offline indication
P	RX Switch Pos 1 Ind	Not for customer use
R	+24V	Not for customer use
S	System Mute Control	When **AUX=1**, unit is muted until this pin is tied to ground (Pin K). When tied to ground, the unit unmutes. See the AUX remote command in Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT.
T	Switch Common	GND reference for Pin N
U	Ethernet RX-	Pin 2 of RJ45 female connector
V	Ethernet RX+	Pin 1 of RJ45 female connector

2.2.6 Connector J6 | COM1 (Ethernet Communications Port – PS .5 ONLY)



Connector Type	Ref Des | Name	Direction
Weatherproof RJ-45 female modular jack (Samtec USA Corp. P/N RPBE-01)	J6 | COM 1	In/Out

CAUTION

For permanent Ethernet connections, you MUST use the appropriate mating connector on your supplied Ethernet cable to ensure a weatherproof installation.

Comtech EF Data offers two mating connector kits (CEFD P/N KT-0020707 for 5.00-5.75 mm jacket OD Ethernet cables, or CEFD P/N KT-0020708 for 5.75-6.50 mm jacket OD Ethernet cables). See Sect. 2.2.6.1 and Figure 2-4.

This interface operates at 10/100/1000 Mbps, half and full duplex, auto-negotiating.

The maximum Ethernet packet size is 1522 bytes (including Ethernet headers and CRC).

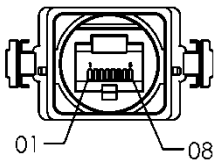
2.2.6.1 Fabricating a Weatherproof Ethernet Cable

Follow these steps to assemble the cable (see Figure 2-4):

Step	Task
1	Thread the user-supplied RJ-45 CAT5e Ethernet cable (Item 1) through the Item 2 components (Items 2.3 through 2.6): Be sure to strip the cable end 15mm. Be sure to note the order and orientation of all kit items before final assembly of the components.
2	Crimp the RJ-45 modular plug (Item 2.1) onto Item 1. Be sure to maintain the cable wiring per the Note 3 wiring table.
3	Snap Item 2.1 into the Ethernet Shroud (Item 2.2). Then, snap Item 2.2 into the Latched Housing (Item 2.3).
4	Slide the Sealing Gland (Item 2.4) into its seated position in Item 2.3.
5	Slide the Compression Cage (Item 2.5) onto Item 2.4.
6	Screw the Cable Nut (Item 2.6) into assembled position against Item 2.3. (Be sure the mating surfaces of the Latched Housing and Cable Nut are touching.) **DO NOT OVERTIGHTEN.**

△ Figure 2-4 Notes (Assembly Detail Source: Samtec USA Corporation)

1 Cable end is shown here as assembled.
2 Be sure to strip Item 1 to 15mm.
3 Be sure to maintain Item 1 to Item 2.5 wiring as follows:



Connector End View

POS	COLOR	WIRE
01	WHITE/ORANGE	TWISTING
02	ORANGE	
03	WHITE/GREEN	TWISTING
04	BLUE	
05	WHITE/BLUE	TWISTING
06	GREEN	
07	WHITE/BROWN	TWISTING
08	BROWN	

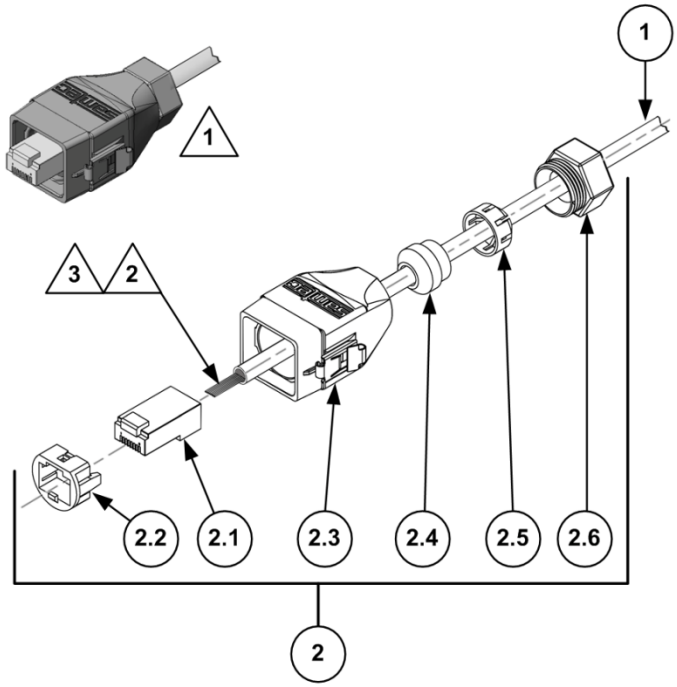


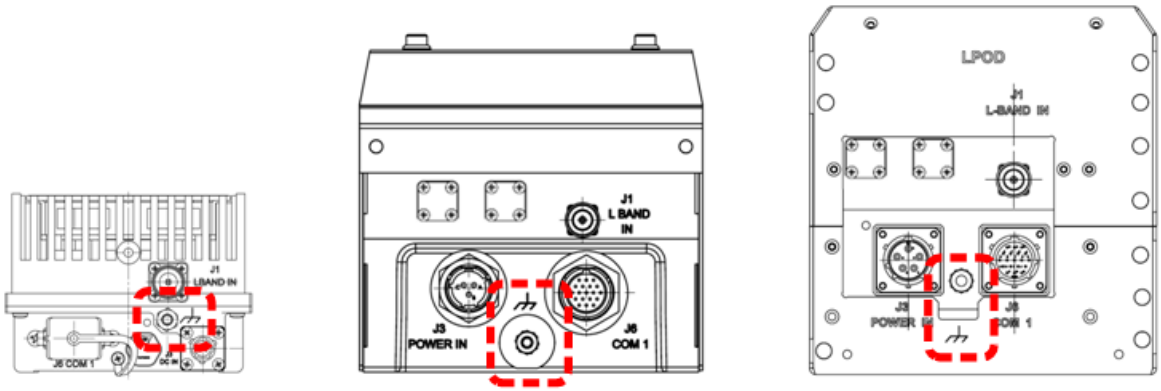
Figure 2-4. LPOD-R Ethernet Connector Field Termination Kit Assembly

Item	Part No. (Comtech/CEFD or Samtec/SC)	Description
1	PROVIDED BY USER	5.6 mm OD or 6.5 mm OD 8-wire CAT5e Ethernet Cable, length A/R
2	KT-0020707 (CEFD)	Samtec USA P/N RCEF-G-01 RJ-45 Weatherproof Connector for 5.0-5.75 mm OD CAT5e Ethernet Cable
	KT-0020708 (CEFD)	Samtec USA P/N RCEF-G-02 RJ-45 Weatherproof Connector for 5.75-6.5 mm OD CAT5e Ethernet Cable

Item	Part No. (Comtech/CEFD or Samtec/SC)	Description
2.1	SUB-MODP-01-8P8C-S-01 (SC)	RJ-45 Modular Ethernet Plug
2.2	RCEF-B-02 (SC)	Ethernet Shroud, Nylon
2.3	RCEF-B-01 (SC)	Latched Housing, Nylon
2.4	SG-17-01 (SC)	Sealing Gland, Neoprene (for 5.0-5.75 mm OD CAT5e Ethernet Cable, P/O RCEF-G-01)
	SG-17-02 (SC)	Sealing Gland, Neoprene (for 5.75-6.5 mm OD CAT5e Ethernet Cable, P/O RCEF-G-02)
2.5	NCC-17-01 (SC)	Compression Cage, Nylon
2.6	SCN-17-02 (SC)	Cable Nut, Nylon

2.2.7 Ground Connector

The #10-32 stud shown in Figure 2-5 provides connection of a common chassis ground among equipment.



LPOD-R PS .5 LPOD-R PS 1 LPOD-R PS 1.5

Figure 2-5. LPOD-R Ground Connector Locations

2.3 Single Thread (Standalone) LPOD-R Installation

Kits are available from Comtech EF Data to mount and install a standalone LPOD-Rs, depending on the type of unit ordered and its operational frequency.

Figures on the pages that follow illustrate available standalone mounting kits:

FIGURE	CEFD PART NO.	DESCRIPTION
2-6	PL/12319-1	Universal Pole Mounting Kit
2-7	KT-0000095	LPOD-R PS 1/PS 1.5 Single Unit Mounting Kit

Refer to Appendix A. CABLE DRAWINGS for information pertaining to the cables that are available for use with the LPOD-R in standalone operation.

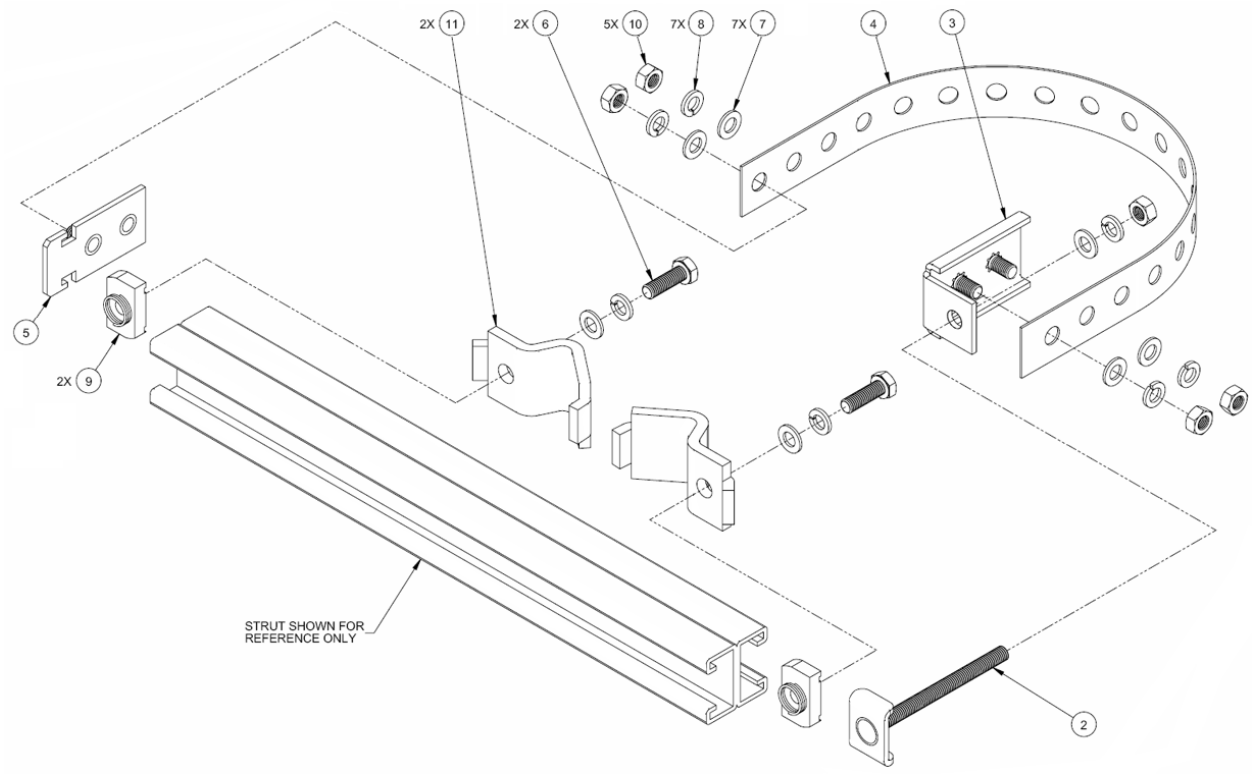


Figure 2-6. PL/12319-1 Universal Pole Mounting Kit

ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	N/A	BRACKET, UNISTRUT (SHOWN FOR CLARITY ONLY, INCLUDED SEPARATELY IN CEFD MOUNTING KIT, e.g., P/N FP/BR0078, PART OF P/N KT-0000095)
2	1	FP/BR0072	BRACKET, STRAP TENSIONER
3	1	FP/BR0070	BRACKET, STRAP-TERMINATION POLE MOUNTING KIT
4	1	FP/BR0071	BRACKET, 1-1/4 STRAP (TRIM LENGTH AS REQUIRED)
5	1	FP/BR0069	BRACKET, STRAP-FIXED, POLE MOUNTING KIT

ITEM	QTY	CEFD PART NO.	DESCRIPTION
6	2	HW/M8X1.25X25HEXSS	BOLT, HEXHEAD, M8X1.25X25, SS
7	7	HW/M8FLATSS	WASHER, FLAT, M8 SS, METRIC
8	7	HW/M8LOCKSS	LOCK WASHER, SPLIT, M8, SS, METRIC
9	2	HW/M8SPRINGNUT	SPRINGNUT, M8X1.25
10	5	HW/M8X1.25MMHEXNUTSS	NUT, HEX M8X1.25X16MM, SS
11	2	HW/BLK-PIPE2-8	PIPE, BLOCK

This kit accommodates a pole diameter (OD) of up to 13.00” (33.02 cm) maximum.

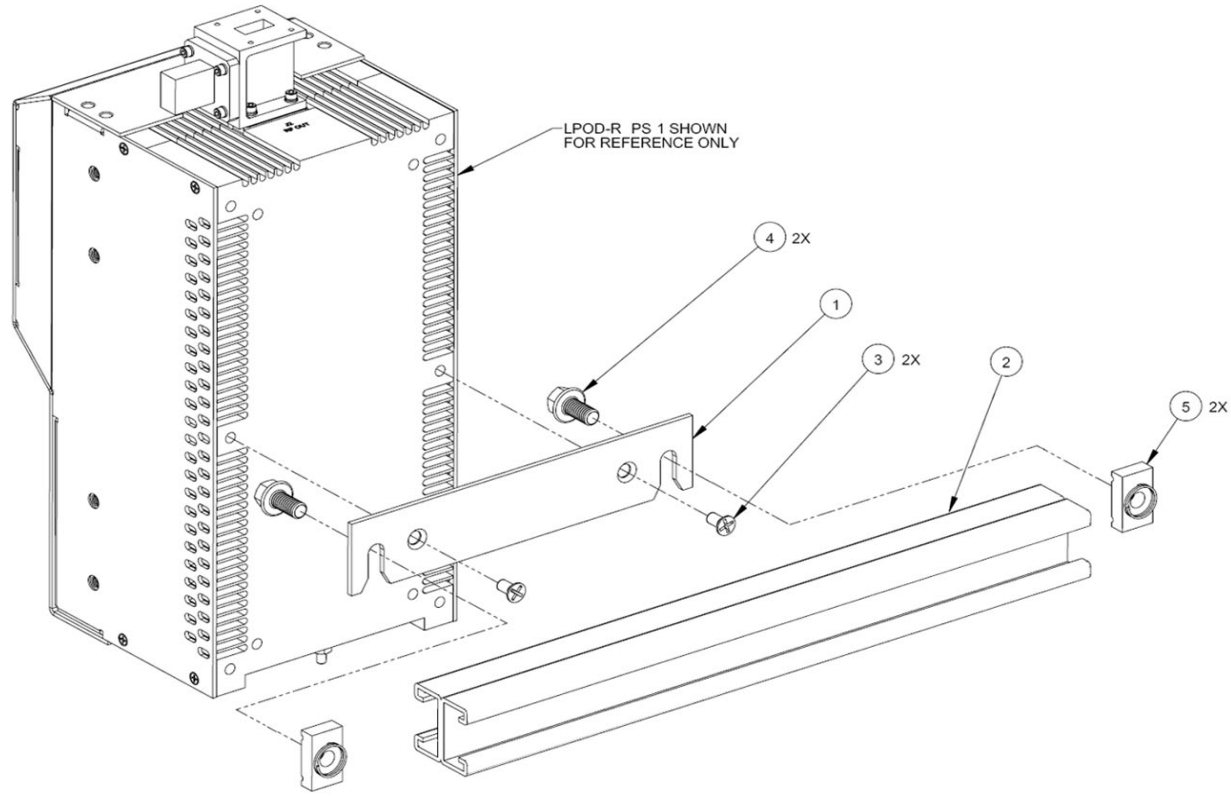


Figure 2-7. KT-0000095 LPOD-R PS 1, 1.5 Single Thread Mounting Kit

ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	FP-0000534	BRACKET, MOUNTING
2	1	FP/BR0078	BRACKET MODIFICATION POLE MOUNTING KIT
3	2	HW/1/4-20X1/2FH	SCREW, 1/4-20 X 1/2 FH PHIL, 82, UCUT, SS
4	2	HW-0000070	SCREW, HEX, SERR FLANGE HD, 3/8-16 x 3/4, SS
5	2	HW/3/8SPRINGNUT	SPRINGNUT, 3/8-16, SHORT SPRING, SS (P3300)

2.4 Set the LPOD-R Power On

WARNING

For safety reasons, NEVER TURN THE UNIT ON WITHOUT PROPER WAVEGUIDE TERMINATION ON THE J2 | RF OUT PORT. INDIVIDUALS CAN OTHERWISE BE EXPOSED TO DANGEROUSLY HIGH ELECTROMAGNETIC LEVELS.

The LPOD-R does not contain a Power On/Off switch. It is powered ON by connecting the J3 | POWER IN connector to the appropriate prime power source. The Mute or Transmit status of the unit will automatically come up in the last stored state (factory default = Transmit on, not muted).

2.4.1 Monitoring LPOD-R Operation with the LED Indicator (PS .5 ONLY)

The LPOD-R PS .5 features a multi-color Light-Emitting Diode (LED) Indicator. Figure 2-8 shows the location of this feature, on the signal output side of the LPOD-R PS .5 housing, next to the ground lug. This LED provides you with visual cues to the operational status and LO setting for the system.

Figure 2-8. LPOD-R PS .5 LED Indicator

A steadily-lit LED indicates that the unit is set for standard 14.0-14.5 GHz uplink frequency. A blinking LED indicates that the unit is set for 13.75-14.5 GHz Tx frequency. Upon power-up of the unit, the LED indicates operating status as per the following table:

OPERATING STATUS	LED COLOR	UNIT STATE
Standard 14.0-14.5 GHz Uplink Frequency	Green	Unmuted, 13.05 GHz LO
	Yellow	Muted, 13.05 GHz LO
	Red	Faulted, 13.05 GHz LO
13,.75-14.5 GHz Tx Frequency Operation	Green (blinking)	Unmuted, 12.8 GHz LO
	Yellow (blinking)	Muted, 12.8 GHz LO
	Red (blinking)	Faulted, 12.8 GHz LO

Chapter 3. UPDATING FIRMWARE

3.1 Introduction

NOTE: For optimal performance, make sure to operate the LPOD-R with its latest available firmware.

Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) are factory-shipped with the latest version of operating firmware. You can apply the firmware update to the LPOD-R without having to remove it from operation. If you need to update the firmware, you can acquire the download from Comtech EF Data Product Support via e-mail or on CD by standard mail delivery.

3.1.1 LPOD-R Firmware Update Process Summary

1. Download the firmware update archive file to a user-supplied PC. The PC must be Microsoft Windows® compatible. It can be Comtech EF Data's optional LPODnet. The LPODnet is available for Ethernet-based remote monitor and control (M&C) of the LPOD-R PS .5.
2. Connect a user-supplied Ethernet cable from the **J9 | COM1** RJ-45 Ethernet port on the LPOD-R PS.5 directly to the Ethernet port of the User PC. You can also use Comtech EF Data's optional CLC-10 Handheld Terminal M&C Accessory Kit (CEFD Kit KT-0020518) for optional serial-based M&C of the LPOD-R PS 1 or PS 1.5.
3. Extract the firmware update files from the archive download file. Use the LPOD-R Management IP Address to connect the FTP client to an FTP server. FTP transfer the files from the User PC to the LPOD-R.

3.2 Prepare for the Firmware Download

3.2.1 Required User-supplied Items

A Microsoft Windows-based PC equipped with available serial and Ethernet ports, a compatible Web browser (e.g., Internet Explorer), and a terminal emulator program (e.g., Tera Term or HyperTerminal). See Figure 3-1.

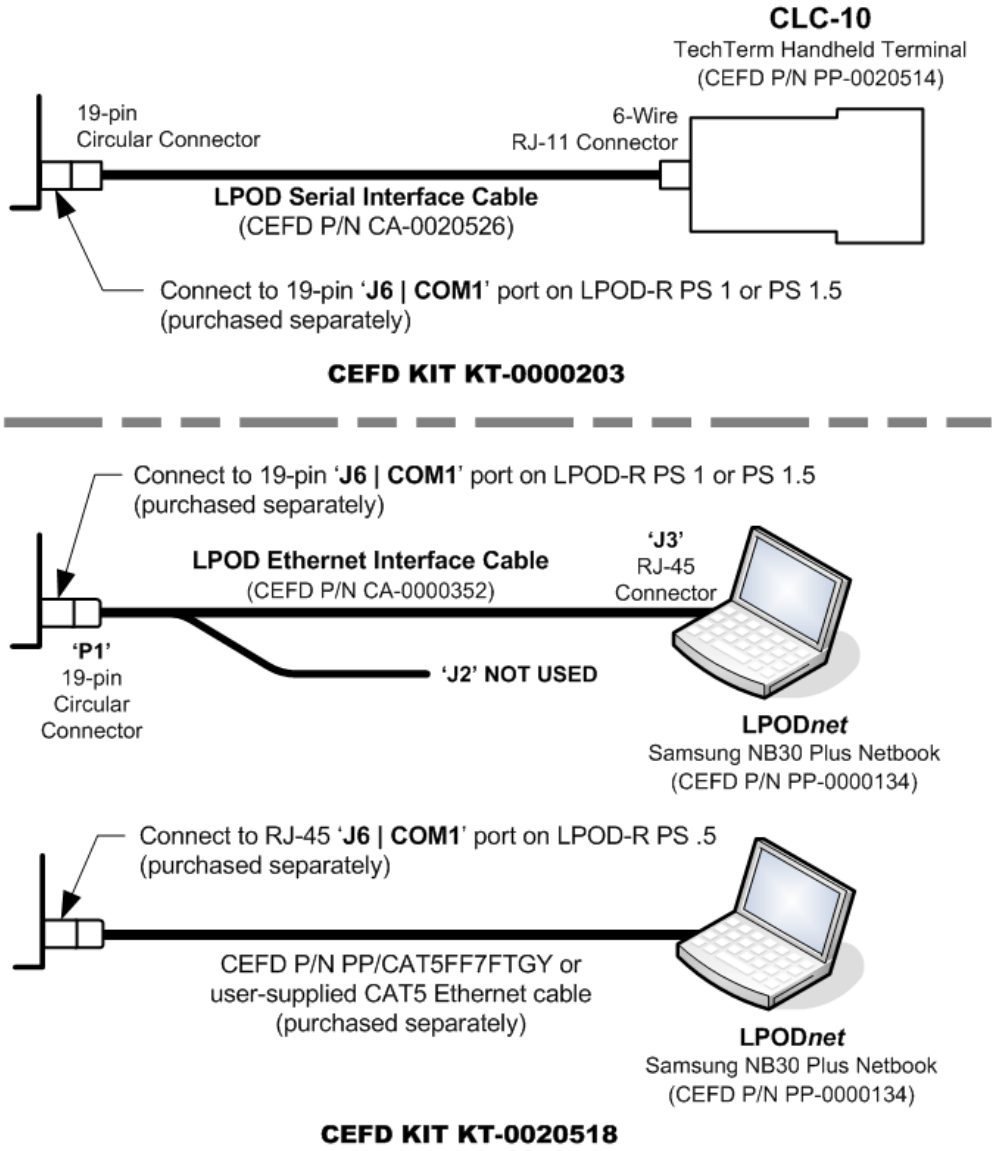


Figure 3-1. Monitor and Control Utilities Available from Comtech EF Data

3.2.1.1 LPOD-R PS .5 connections

You can use Comtech EF Data's optional LPODnet (part of CEFD M&C Netbook Accessory Kit KT-0000203) for Ethernet-based monitor and control of the LPOD-R PS .5 unit.

Use an Ethernet cable to connect the LPOD-R PS .5 directly to the Ethernet port of the User PC.

3.2.1.2 LPOD-R PS 1 or PS 1.5 connections

Use the 19 pin-to-RJ-45 adapter cable (CEFD P/N CA-0000352) that is part of the LPODnet Netbook Accessory Kit to connect the LPODnet or the User PC to the LPOD-R PS 1 or PS 1.5 19-pin **J6 | COM1** port,

You can use Comtech EF Data's optional CLC-10 Handheld Terminal (part of CEFD M&C Accessory Kit KT-0020518) for serial-based monitor and control of the LPOD-R PS 1 or PS 1.5 (when the optional EIA-232/485 serial interface is available). This kit provides an adapter cable (CEFD P/N CA-0020526) to connect the CLC-10 to the PS 1 or PS 1.5 19-pin **J6 | COM1** port.

You can use a user-fabricated 9 pin-to-19 pin adapter cable to directly connect the PC serial port to the LPOD-R PS 1 or PS 1.5 19-pin **J6 | COM1** port if you are using a user-supplied terminal emulator program.

3.2.2 Configure the Terminal Emulator Program, if necessary

On the User PC – If not using the CLC-10, configure the terminal emulator program as necessary.

Refer to your terminal emulator program HELP feature or user guide for operating and configuration instructions.

Configure the utility program serial port communication and terminal display operation:

38400 bps (Baud Rate)	8 Data Bits	1 Stop Bit
Parity = NO	Port Flow Control = NONE	Display New line Rx/Tx: CR
Local Echo = ON		

3.2.3 Find the LPOD-R firmware and version numbers

1) On the LPOD-R – Set the power on for the unit. Your power connection varies depending on the unit ordered.

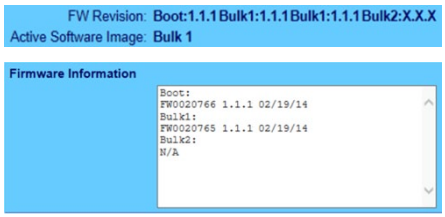
See Chapter 2. SYSTEM CONNECTIONS, INSTALLATION AND STARTUP in this manual for specific power connectors.

2) Find the firmware information using either of these methods:
   - To use the Web Server Interface, see Section 3.2.3.1.
   - To use the optional serial remote control, see Section 3.2.3.2.

3.2.3.1 Use the Web Server Interface to find the firmware version

1) Go to the **Status | Summary** page, or Go to **Config | Utility** page, **Firmware Information** section. Or, go to the **Status | Summary** page.

2) Look at the **Bootrom**, **Image1** and **Image2** firmware loads.



See Chapter 4. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT for more information on using the LPOD-R Web Server Interface

3.2.3.2 Use the optional serial remote control to find the firmware version

Use the CLC-10 or a user-supplied terminal emulator program to execute remote queries with the LPOD-R. Use either of these remote queries to find the firmware information:

- Condensed : **<0/SWR?**
  (returns the firmware version numbers running under Boot, Bulk1, and Bulk2, in the form B.B.BB)
- Detailed : **<0/FRW?**
  (returns the complete information of the firmwares running under Boot, Bulk1, and Bulk2 in the form FW- AAAAAAA B.B.BB DD/MM/YY,
  where:
  - FW-AAAAAAA = the firmware part number
  - B.B.BB = the firmware version number
  - DD/MM/YY = the firmware release date (Day/Month/Year)

See Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT for more information on using remote commands/queries.

3.2.4 Make a temporary folder (subdirectory) on the User PC

The temporary folder is where you store the firmware archive download.

NOTE: These examples specify drive letter **c:**. You can use any valid, writable drive letter.

There are several ways you can make a temporary folder on a Windows PC:

- To use the Windows Desktop, see Section 3.2.1
- To use Windows Explorer, see Section 3.2.2
- To use the Run and Browse windows, see Section 3.2.3

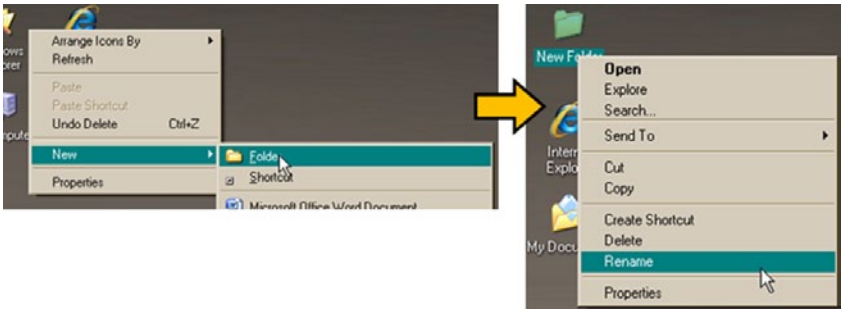
- To use Windows Command line, see Section 3.2.4

After you make the temporary folder, proceed to Section 3.3 to download and extract the firmware files.

3.2.5 Use the Windows Desktop to make a temporary folder

Use the Windows Desktop to make and rename the temporary folder.

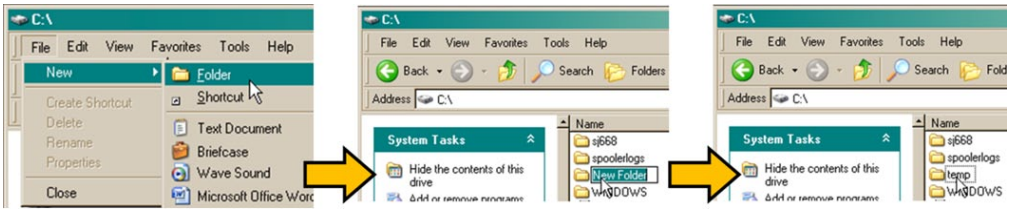
1. Right-click anywhere on the desktop to open the popup submenu.
2. Select **New > Folder** to make the new, temporary folder on the desktop.
3. Right-click on the new folder and then select **Rename** from the popup submenu.
4. Rename this folder to **temp** or some other convenient, unused name.



3.2.6 Use Windows Explorer to make a temporary folder

Use Windows Explorer to make and rename the temporary folder.

1. Select **File > New > Folder** to make the new, temporary folder in the active location.
2. Right-click the **New Folder** folder name, and then rename this folder to **temp** or some other convenient, unused name.

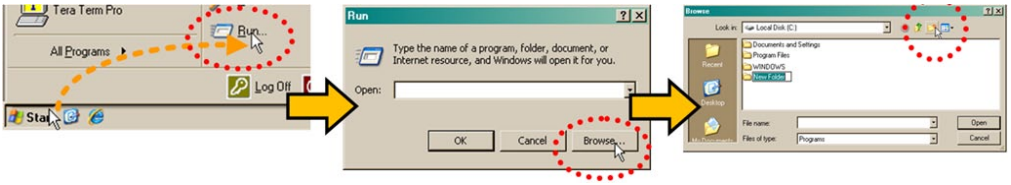


3.2.7 Use the Run and Browse windows to make a temporary folder

Use the **Run** and **Browse** windows to make and rename the temporary folder.

1. Select **Start** on the Windows taskbar and then
2. Click **Run…** to open the **Run** window.
3. Click **Browse…** to open the **Browse** window.

4. Click **New Folder**. This can be an icon or a text label, depending on the Windows version.
5. Name this new folder **temp** or some other convenient, unused name.

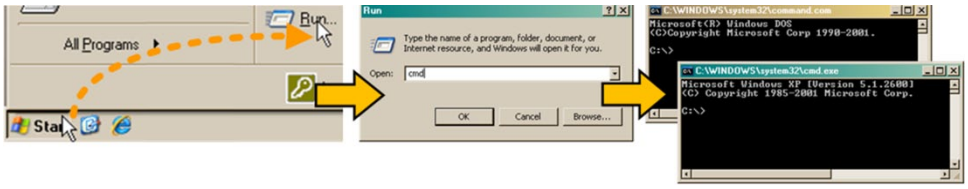


3.2.8 Use Windows Command line to make a temporary folder

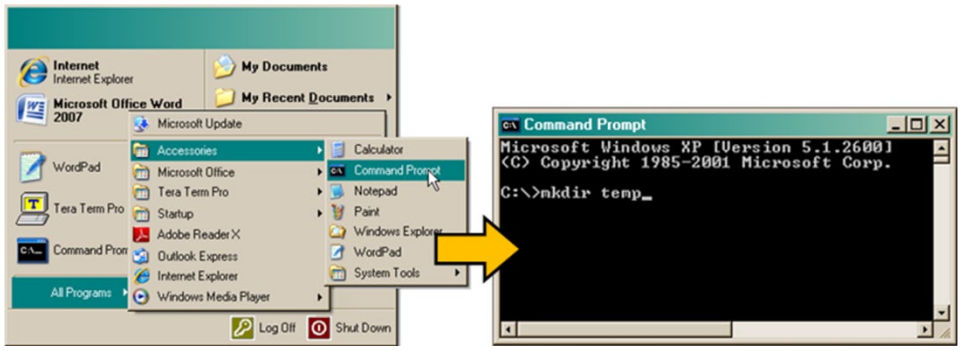
1. Click **Start** on the Windows taskbar, and then click **Run...** to open the **Run** window.
   - Depending on Windows OS versions prior to Windows 95, click the **MS-DOS Prompt** icon from the Main Menu.
   - Alternately, from **Start**, select **All Programs > Accessories > Command Prompt**.
2. Next, open a Command line window:

NOTE: Typical for many steps: Type the command, and then press **Enter**.

   - For Windows 95 or Windows 98 – enter **command**.
   - For any Windows OS versions later than Windows 98 – enter **cmd** or **command**.



3. Finally, from the Windows Command line **c:\>** prompt, type either:
   - **mkdir temp** or **md temp**
     (both **mkdir** and **md** mean **make directory**).
4. Click **OK**.



3.3 Download and Extract the Firmware Update Files

3.3.1 About Firmware Numbers, File Versions, and Formats

The Comtech EF Data Web site catalogues its firmware update files by product type (e.g., router, modem, etc.), the specific model, and optional hardware configurations.

The LPOD-R firmware download hyperlink appears as FW-0020841**X**-V**###** (for the LPOD-R PS .5) or FW-0020880X_V### (for the LPOD-R PS 1 or PS 1.5).

NOTE: Where:

X represents the revision letter

represents the firmware version number; e.g., V111 = Version 1.1.1

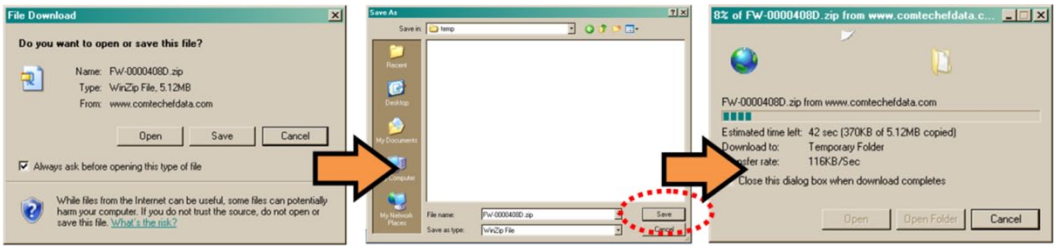
About File Archive Formats: Comtech EF Data provides its downloadable files in two compressed archive formats: *.exe (self-extracting) and *.zip (compressed).

The *.exe file does not require a file archiver and compression utility program such as PKZIP for Windows, WinZip, ZipCentral, etc. (PKZIP for DOS is not supported because of file naming conventions). Comtech EF Data does not provide this utility program.

Some firewalls do not allow the download of *.exe files. Download the *.zip file instead, and extract the firmware files from the archive download with a user-supplied utility program. For detailed information on handling archived files, see the utility program Help documentation.

3.3.2 Steps to Download and Extract the Firmware Update Files

1) Download the firmware update file from the Comtech EF Data Web site:
   a) Go online to www.comtechefdata.com.
   b) On the Main page – Under **Support Information** or the **Support** tab, select the **Software Downloads** hyperlink.
   c) On the **Software Downloads** page – Click **Download Flash and Software Update Files**.
   d) On the **Flash Updates Index** page – Select the (**Select a Product Line**) **Amplifiers** hyperlink.
   e) On the **Amplifiers** product page – Select the **LPOD-R** product hyperlink;
   f) Select the appropriate firmware archive EXE or ZIP file download hyperlink.
   g) Download the archive file to the temporary folder.
      i) Once you select the EXE or ZIP hyperlink, the **File Download** window opens and prompts selection of **Open** or **Save**:
      ii) Click **Open** to execute file extraction with a user-supplied utility program. Be sure to extract the firmware files to the **temp** folder maked earlier.
      iii) Click **Save** to open the **Save As** window. Select and Save the archive *.exe or *.zip file to the **temp** folder maked earlier.
      iv) Otherwise, click **Cancel** to quit and exit the file download process.


File Download
Do you want to open or save this file?
Name: FW-0000408D.zip
Type: WinZip File, 5.12MB
From: www.comtechefdata.com
Open
Save
Cancel
Always ask before opening this type of file
While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file. What's the risk?
Save As
Save
Cancel
8% of FW-0000408D.zip from www.comtechefdata.c...
FW-0000408D.zip from www.comtechefdata.com
Estimated time left: 42 sec (370KB of 5.12MB copied)
Download to: Temporary Folder
Transfer rate: 116KB/Sec
Close this dialog box when download completes
Open
Open Folder
Cancel

2) Extract the firmware files from the archive file.

   a) (If not already done with **File Download > Open**) Extract the firmware files from the downloaded *.exe or *.zip archive file with the user-supplied utility program:

   b) Double-click on the archive file name, and then follow the prompts provided by the user-supplied utility program. Extract, at a minimum, two files:

   c) FOR THE LPOD-R PS .5:

      i) FW-0020841X_###.bin – The Firmware Bulk image file
      and

      ii) ReleaseNotes_ FW-0020841X_V###.pdf – The Firmware Release Notes PDF file

   d) FOR THE LPOD-R PS 1 OR PS 1.5:

      i) FW-0020880X_V###.bin – The Firmware Bulk image file
      and

      ii) ReleaseNotes_FW-0020880X_V###.pdf – The Firmware Release Notes PDF file file

NOTE: Where:

X	represents the revision letter
###	represents the firmware version number; e.g., V111 = Version 1.1.1

3) Confirm availability of the firmware files in the temporary folder.

   There are several ways you can view the contents of the temporary folder on a Windows-based PC:

   - To use the Windows Desktop, see Section 3.3.2.1
   - To use Windows Command line, see Section 3.3.2.2

   After you confirm the firmware files are in the folder, proceed to Section 3.4 to upload the firmware update to the LPOD-R.

3.3.2.1 Use the Windows Desktop to see the folder contents

1) From the Windows Desktop:

   a) Double-left-click the **temp** folder saved to the Windows Desktop.

b) Use Windows Explorer to locate, and then double-left-click the **temp** folder.

c) Use the **Browse** window (**Start > ...Run > Browse**) to locate, and then double-click the **c:\temp** folder.

3.3.2.2 Use the Windows Command line to see the folder contents

1) Using Command line:

a) Enter **cd c:\temp** at the Windows Command line prompt to change to the temporary directory maked earlier using Command line.

b) Enter **dir** to list the files extracted to the temporary directory from the downloaded archive file.

3.4 FTP Upload the Firmware Files and Update the LPOD-R Unit

3.4.1 Important Considerations

Before you proceed with the firmware update, make sure that:

- The LPOD-R is connected to a user-supplied, Windows-based PC.
- The latest firmware files have been downloaded or otherwise received from Comtech EF Data and are available on the User PC in an accessible temporary folder.
- The PC serial port is connected to the LPOD-R via the 19-pin **J6 |COM1** port with the correct adaptive cabling.
- The PC is running a terminal emulation program for operation of the LPOD-R Serial or Telnet interfaces.
- The PC is running a compatible Web browser for operation of the LPOD-R Web Server Interface.

3.4.2 Steps to FTP Upload the Firmware Files

1) Find the IP Address of the LPOD-R:

a) Use the LPOD-R Web Server Interface or, the serial remote control:

- Using the LPOD-R Web Server Interface – look at the entry for IP Address/Range in the Network Maintenance section of the **Admin | Access** page:

- Using Serial Remote Control – Enter the **<0/IPA?** remote query at the command prompt. The unit returns the configured IP Address.

2) Use Windows Command line to send a ping command to confirm correct connection and communication between the User PC and the LPOD-R:

a) Ping the unit by entering **ping xxx.xxx.xxx.xxx** at the Windows Command line prompt. The response should confirm whether the unit is connected and communicating correctly.

NOTE: Where:
xxx.xxx.xxx.xxx represents the assigned unit Management IP Address

3) Use Windows Command line to transfer the files from the User PC to the LPOD-R unit via FTP:

a) Enter **ftp xxx.xxx.xxx.xxx**.

NOTE: Where:
xxx.xxx.xxx.xxx represents the assigned unit Management IP Address

b) Enter **bin** to set the binary transfer mode.

c) Enter **prompt**.

d) Enter **hash**.

e) To begin the file transfer:

For the LPOD-R PS .5 only, enter **put FW-0020841X.bin a:\bulk.bin:**
or
For the LPOD-R PS 1 or 1.5,enter **put FW-0020880X.bin a:\bulk.bin:**

The destination **a:\bulk.bin:** must be all lower-case.

NOTE: Where:
X represents the revision letter
represents the firmware version number; e.g., V111 = Version 1.1.1

f) Wait for the file transfer to end.

g) Enter **bye** to stop the FTP session.

h) Close the Windows Command line window.

4) To verify that the PC-to-unit FTP file transfer was successful, find the current firmware information via the serial or Ethernet interfaces (see Section 3.4.2, Step 1).

3.4.3 Steps to Update the LPOD-R Unit

Use the LPOD-R Web Server Interface to select the new firmware and soft-reboot the unit.

1) Select the desired **Active Firmware Image**:

a) Go to the **Config | Utility** page.

b) Use the **Next Reboot Image** drop-down list to select Image **1** or **2**.

c) Click **Submit**.

2) Soft-reboot the LPOD-R:

a) In the **Config | Utility** page, **Perform Soft Reboot** section.

b) Click **Reboot Now** to reboot the LPOD-R with the **Current Active Firmware Image**.

c) Wait while the LPOD-R reboots.

3) To load a second image, repeat Step 1.

4) After the unit has rebooted with the new firmware, use serial remote control to enter the **<0/CTD=1?** remote command to clear the trending data.

The LPOD-R is now operating with its latest firmware. The firmware update process is complete.

3.5 Recover the User Interface Access

The **J9 | COM1** RJ-45 Ethernet port on the LPOD-R is the only means of access for monitor and control (M&C) of the product. Loss of the unit's Management IP Address or the interface access credentials (the username/password and SNMP communities) prevents you from monitoring and controlling the LPOD-R.

You can reset the access credentials for the LPOD-R. By issuing a ping command to IP Address 169.254.1.1 within the first 10 seconds of power cycle/reset of the unit, the LPOD-R resets its access credentials to their factory default settings.

3.5.1 Recovery Steps Using a Windows PC.

1) Change the IP Address of the User PC NIC (the Network Interface Card that controls the Ethernet port connected to the LPOD-R) to **169.254.1.10**:

a) On the Windows taskbar, Click **Start** and then click **Control Panel**.

b) From the **Control Panel** window, click the **Network and Sharing Center** icon.

c) Look for the **View your active networks** section of the **Network and Sharing Center** window.

d) Click the **Local Area Connection** hyperlink (e.g., Local Area Connection 2) to select the targeted NIC.

e) In the **Interface Status** window, click **Properties**.

f) If necessary, click the **Network** tab.

g) In the **This connection uses the following items:** window, select **Internet Protocol Version TCP/IPv4** .

IMPORTANT: Make sure that you do not uncheck the checkbox.

h) Click **Properties**.

i) Enter the **IP address:** into the fields: **169 | 254 | 1 | 10**

IMPORTANT: Make sure that you do not deselect the **Use the following IP address:** radio button.

j) Click **OK** to save the change.

2) If you have not already done so, connect a user-supplied Ethernet cable from the **J9 | COM1** RJ-45 Ethernet port on the LPOD-R directly to the Ethernet port of the User PC.

3) Use Windows Command line to ping the actively running LPOD-R:

   a) Enter **ping -t 169.254.1.1** to begin repeatedly pinging the LPOD-R.

4) Cycle the LPOD-R power as the User PC continues to ping the unit.

5) Continue to observe the ping responses in the Windows Command line window.

6) Wait for one successful ping reply, followed by an unsuccessful ping – once the LPOD-R receives a ping on IP address 169.254.1.1 within the first 10 seconds of the units power-up or reset, it restores the interface access factory default values:

   - DEFAULT MANAGEMENT IP ADDRESS/RANGE – **192.168.1.4/24**
   - DEFAULT WEB SERVER INTERFACE USERNAME – **Comtech**
   - DEFAULT WEB SERVER INTERFACE PASSWORD – **comtech**

7) As described in Step 1, change the IP address of the User PC's assigned Ethernet port to an address within the 192.168.1.XXX subnet (i.e., assign a Management IP Address to the LPOD-R from 192.168.1.001 through 192.168.1.255).

The LPOD-R management interface is now accessible and ready for M&C of the unit.

Chapter 4. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT

4.1 Introduction

Ethernet remote monitor and control (M&C) of the LPOD-R PS .5 is available through its 100BaseT/10BaseTx Ethernet Management Interface by connecting the User PC Ethernet port to the **J6 | COM1** RJ-45 port on the LPOD-R.

Three protocols are available to use for Ethernet remote M&C. Operate these protocols separately.

- Simple Network Management Protocol (SNMP). This requires a user-supplied Network Management System (NMS) and a user-supplied Management Information Base (MIB) File Browser.
- Telnet Interface. This requires use of the User PC's Command line interface, or a user-supplied terminal emulation program, such as HyperTerminal.
- Web Server (HTTP) Interface. This requires a compatible user-supplied web browser such as Internet Explorer.

4.1.1 Prerequisites

Before you proceed with Ethernet remote product management, make sure the following is true:

- The LPOD-R is operating with the latest version firmware files.
- The User PC is running a terminal emulation program for operation of the LPOD-R Telnet Interface.
- The User PC is running a compatible web browser for operation of the LPOD-R Web Server Interface.
- The user-supplied Windows PC is connected to the LPOD-R as applicable:
    - PS 0.5: The **J6 | COM1** port on the unit connects to the User PC Ethernet port with a user-provided Ethernet cable that has the available weatherproof connector kit (CEFD P/N KT-0020707 or KT-0020708).

- PS 1/1.5: The **J6 | COM1** port on the unit connects to the User PC Ethernet port with the available CA-0000352 Ethernet Interface Cable (part of CEFD Kit KT-0000203).

- You have recorded the LPOD-R's Management IP Address.

CAUTION

Comtech EF Data recommends use of the Ethernet-based SNMP interface for advanced users only. All other users are strongly encouraged to use the LPOD-R web server interface for remote Monitor and Control (M&C) of the LPOD-R.

4.2 SNMP Interface

SNMP is an Internet-standard protocol for managing devices over IP networks. An SNMP-managed network has three key components:

- The managed device. This includes the LPOD-R.
- The SNMP Agent. This software runs on the LPOD-R. The LPOD-R SNMP Agent supports both SNMPv1 and SNMPv2c.
- The user-supplied NMS. This software runs on the User PC.

4.2.1 Management Information Base (MIB) Files

An MIB file is used for SNMP remote management of a unique device, and consist of a tree of nodes called Object Identifiers (OIDs). Each OID provides remote management of a particular function. These MIB files should be compiled in a user-supplied MIB Browser or SNMP Network Monitoring System server.

In these LPOD-R MIB file names,the letter x represents the revision of the file.

4.2.1.1 ComtechEFData Root MIB file

- FW-0000291x.mib
- ComtechEFData MIB file gives the root tree for all Comtech EF Data LPOD-R products (PSx) and consists of only the following OID:
  - Name: comtechEFData
  - Type: MODULE-IDENTITY
  - OID: 1.3.6.1.4.1.6247
  - Full path: iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247)
    Module: ComtechEFData

4.2.1.2 LPOD-R MIB file

- FW-0000289x.mib
- MIB file consists of all of the OID's for management of the LPOD-R functions

4.2.1.3 LPOD-R Traps MIB file

- FW-0000290x.mib
- Trap MIB file provides SNMPv1 traps common for LPOD-R.

4.2.2 SNMP Community Strings

CAUTION

In SNMP v1/v2c, the SNMP Community String is sent unencrypted in the SNMP packets. Caution must be taken by the network administrator to ensure that SNMP packets travel only over a secure and private network if security is a concern.

The LPOD-R uses Community Strings as a password scheme that provides authentication before gaining access to the router agent's MIBs. They are used to authenticate users and determine access privileges to the SNMP agent. The LPOD-R defines three Community Strings for SNMP access:

- Read Community default = public
- Write Community default = private
- Trap Community default = comtech

Type the SNMP Community String into the user-supplied MIB Browser or Network Node ` Management software.

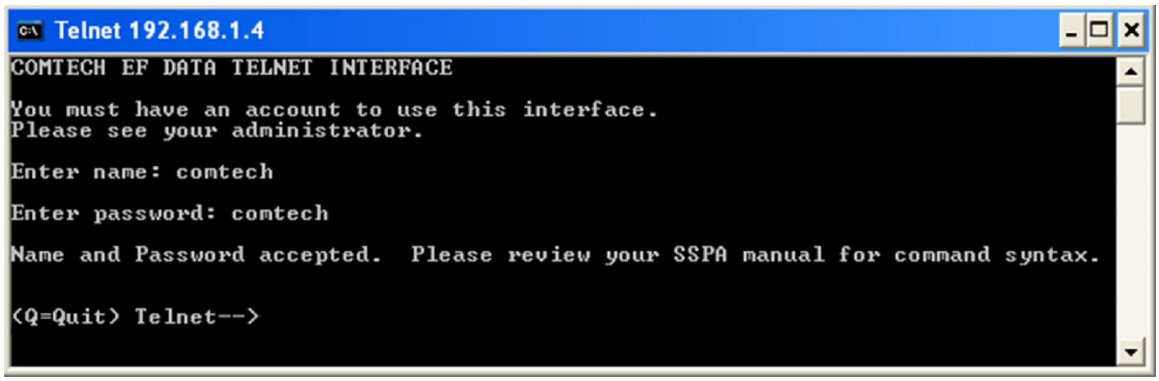
For correct SNMP operation, the LPOD-R MIB files must be used with the associated version of the LPOD-R M&C. See the LPOD-R FW Release Notes for information on the required FW/SW compatibility.

4.3 Telnet Interface

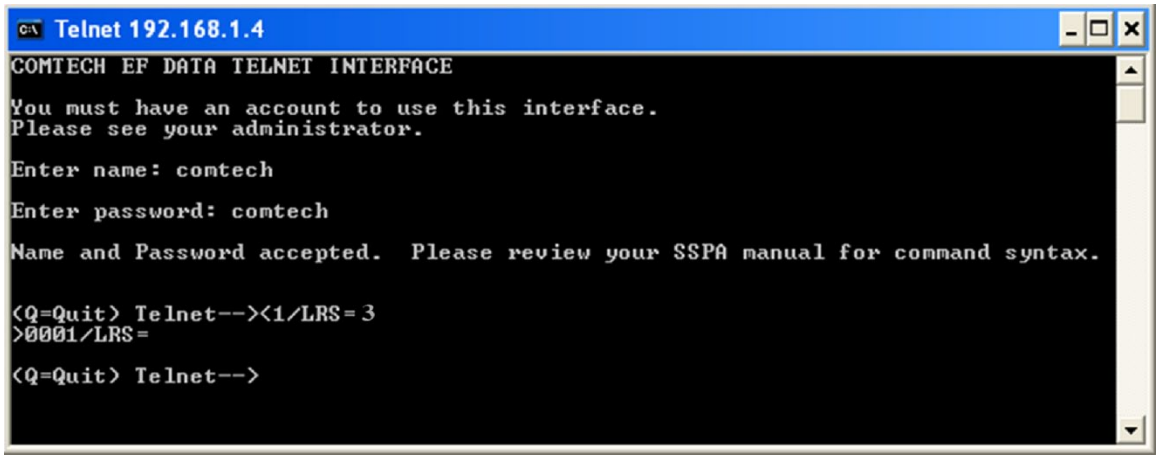
4.3.1 Using the Telnet Interface for Remote Control Operation

Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT

The LPOD-R has a Telnet interface for the purpose of equipment M&C via the optional Serial Remote Control protocol. The Telnet interface requires user login at the **Administrator** level and **Read/Write** level. An example of the login process is shown here:


Telnet 192.168.1.4
COMTECH EF DATA TELNET INTERFACE
You must have an account to use this interface.
Please see your administrator.
Enter name: comtech
Enter password: comtech
Name and Password accepted. Please review your SSPA manual for command syntax.
(Q=Quit) Telnet-->

Once logged into the Telnet interface as the Administrator, you have access to the optional serial-based Remote Control Interface as shown here:


Telnet 192.168.1.4
COMTECH EF DATA TELNET INTERFACE
You must have an account to use this interface.
Please see your administrator.
Enter name: comtech
Enter password: comtech
Name and Password accepted. Please review your SSPA manual for command syntax.
(Q=Quit) Telnet--><1/LRS=3
>0001/LRS=
(Q=Quit) Telnet-->

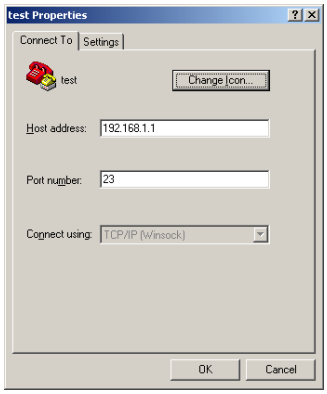
4.3.2 Using HyperTerminal for Telnet Remote Control Operation

There is a disadvantage when using Windows Command line as a Telnet client with the optional Remote Control protocol. For the messages coming from the Telnet Server, Command line cannot translate a carriage return command (**\r**) to a carriage return + line feed command (**\r\n**). Therefore, any multi-line Target-to-Controller response (e.g., the response to the FRW? query) shows as one line, with the latter lines overwriting the previous lines.

To see the full response messages, you can use the HyperTerminal terminal emulation program configured as a Telnet client.

Configure HyperTerminal as follows:

1. Make sure to define the **Connect To** Telnet connection properties correctly (**File → Properties**):

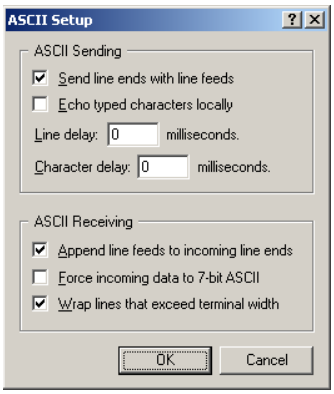


   A) Enter the LPOD-R's Traffic/Management IP Address as the **Host address** (e.g., 192.168.1.1).

   B) Enter TCP Port **23** as the **Port number**.

   C) Set **Connect using** to **TCP/IP (Winsock)** instead of COM1 or COM2.

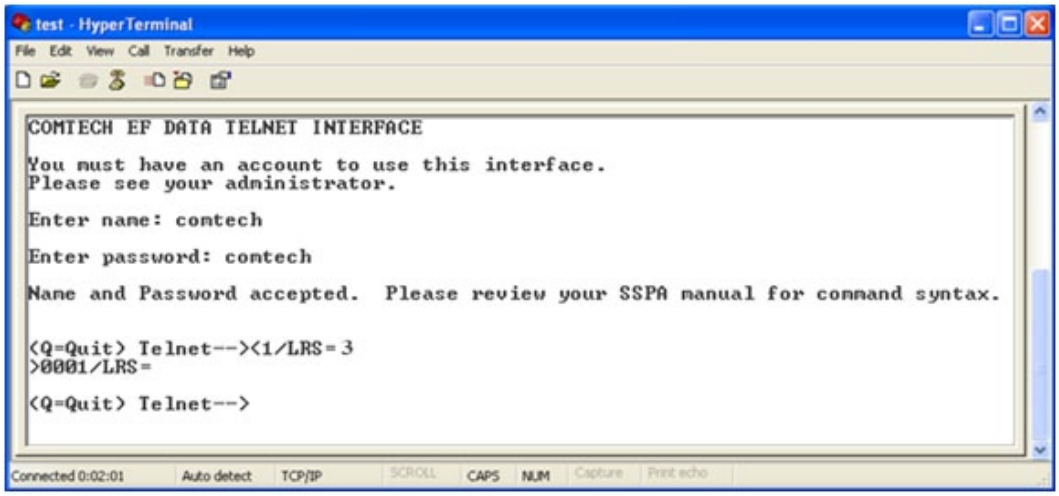
2. For **ASCII Setup** (**File → Properties → Settings → ASCII Setup**):



   A) Check the **Send line ends with line feeds** option in the **ASCII Sending** section.

   B) Check the **Append line feeds to incoming line ends** option in the **ASCII Receiving** section.

Examples of login and remote command/query execution, when using HyperTerminal as the interface, follow:


test - HyperTerminal
File Edit View Call Transfer Help
COMTECH EF DATA TELNET INTERFACE
You must have an account to use this interface.
Please see your administrator.
Enter name: comtech
Enter password: comtech
Name and Password accepted. Please review your SSPA manual for command syntax.
(Q=Quit) Telnet-->(1/LRS=3
>0001/LRS=
(Q=Quit) Telnet-->
Connected 0:02:01
Auto detect
TCP/IP
SCROLL
CAPS
NUM
Capture
Print echo

4.4 Web Server (HTTP) Interface

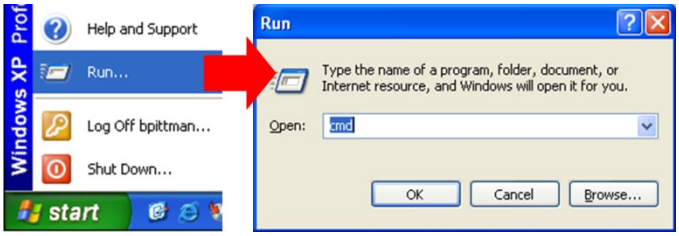
A user-supplied web browser allows the full M&C of the LPOD-R through its Web Server Interface. This embedded web application is designed for use with Microsoft's Internet Explorer Version 5.5 or higher. It is a non-secure web application.

See the Remote Commands and Queries specifications tables in Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT for more information.

4.4.1 Enable the Web Server Interface

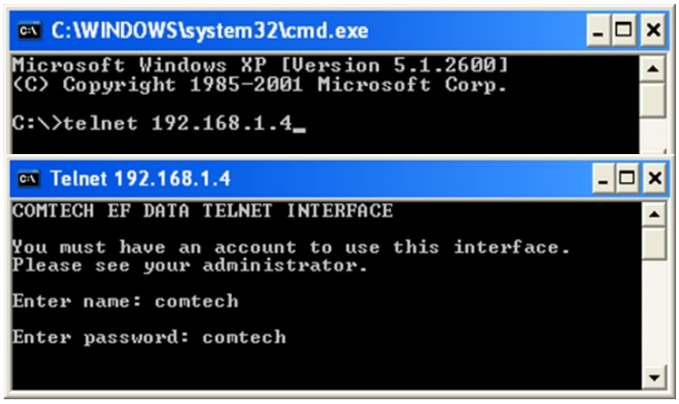
To enable the Web Server Interface in the LPOD-R using only a 100BaseTx remote interface running a Microsoft Windows OS:

1. Select **Start**, then **Run**, then type **cmd**.
2. Click **OK** to open the command prompt window.



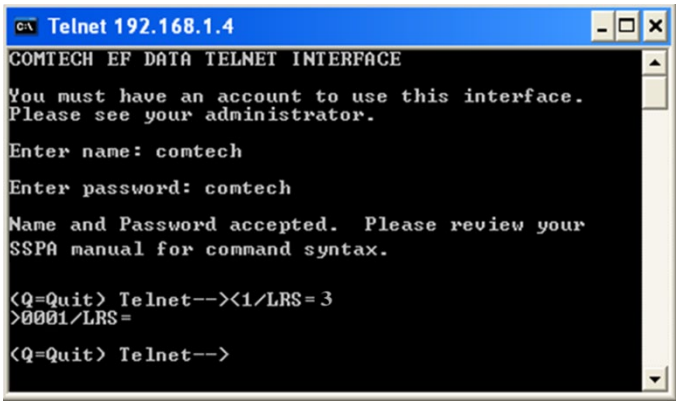
3. Start a Telnet session with the unit at the default IP address of **192.168.1.4**.

4. Enter the Telnet username and password. The default for both parameters is **Comtech**.



5. Set the remote access parameter to accept Ethernet remote control using the **LRS** command.

   LRS=3, the default remote command, provides **Serial + Ethernet control**, while remote command **LRS=2** provides **Ethernet control only**.


Telnet 192.168.1.4
COMTECH EF DATA TELNET INTERFACE
You must have an account to use this interface.
Please see your administrator.
Enter name: comtech
Enter password: comtech
Name and Password accepted. Please review your
SSPA manual for command syntax.
(Q=Quit) Telnet--><1/LRS=3
>0001/LRS=
(Q=Quit) Telnet-->

You must assign a unique IP Address for each unit on the network before connecting to an existing network. The IP address may need to be changed from the factory default setting.

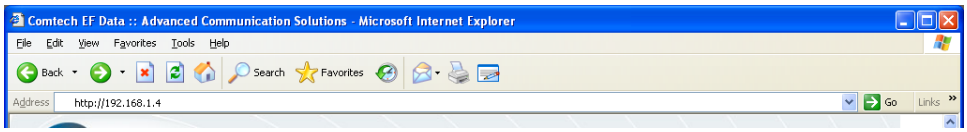
Use the command **IPA=xxx.xxx.xxx.xxx.yy**, where: **xxx.xxx.xxx.xxx** is a valid IP address on the network where the unit is to be installed, and **yy** is the range (typically, **yy** = 24).

Changing the **IPA** value requires that you cycle power on the unit, and then start a new Telnet session using the new IP address.

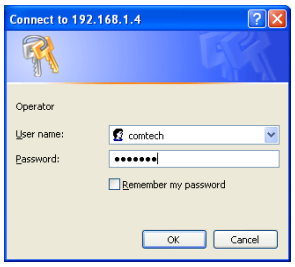
See **Chapter 5** for more information on the **LRS** and **IPA** commands.

4.4.2 User Login

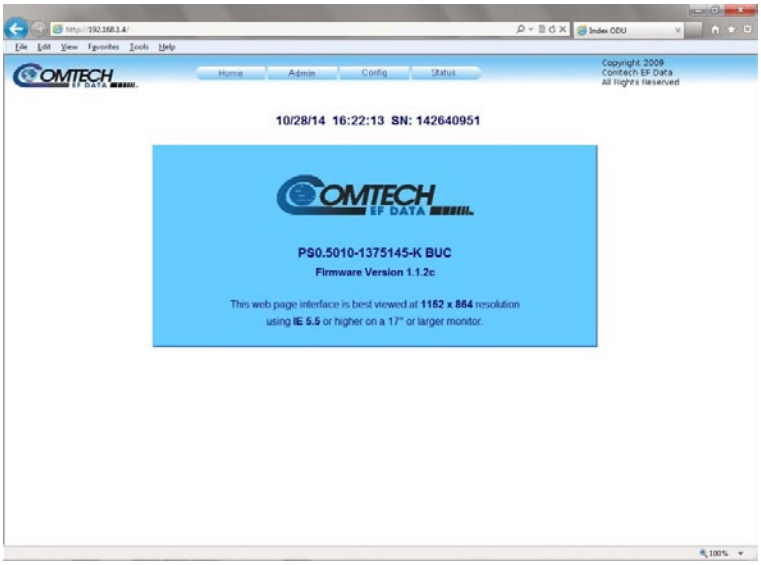
1. From the PC, enter the default IP address for the LPOD-R (e.g., **http://192.168.1.4**) into the **Address** area of the browser.


Comtech EF Data :: Advanced Communication Solutions - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://192.168.1.4
Go Links

2. In the Login window, type the **User name** and **Password,** and then click **OK**. The default User Name and Password are both **comtech**.



Once the valid User Name and Password is accepted, the LPOD-R Web Server Interface splash page shows. The Firmware Version in this example is subject to change.


Home
Admin
Config
Status
10/28/14 16:22:13 SN: 142640951
PS0.5010-1375145-K BUC
Firmware Version 1.1.2c
This web page interface is best viewed at 1152 x 864 resolution
using IE 5.5 or higher on a 17" or larger monitor.

4.4.3 Web Server Interface Operation

4.4.3.1 Menu Tree

This menu tree diagram shows the menus and pages in the LPOD-R Web Server Interface. This interface has four top level navigation tabs, shown in blue. Each top level tab has secondary level page hyperlinks (grey). Page hyperlinks open individual Web pages.

Home	Admin	Config	Status
Home	Access	Amplifier	Summary
Contact	SNMP	Utility	Status
Support			Events
			Statistics

4.4.3.2 Page Navigation

The Web Server Interface has four navigation tabs at the top of each page. Click a navigation tab to see its page hyperlinks. Click a page hyperlink to open a page.

This manual uses a convention for all web pages to show you how to navigate to the referenced page: **Navigation Tab | Page Hyperlink.**

For example, **Home | Home** means click the **Home** navigation tab, and then click the **Home** page hyperlink.

4.4.3.3 Page Sections

Each page has one or more sections. The title at the upper-left corner of each page or section describes its operational features. Each section can have editable fields, action buttons and read-only displays for a specific function. This manual explains the purpose and operation for each Web page and its sections.

4.4.3.4 Action Buttons

Action buttons are important in the LPOD-R Web Server Interface. Click an action button to do one of these tasks:

- Refresh the page with current data.
- Reset changed parameters to remove **unsaved** changes.
- **Submit** (save) changes.

If you change any parameters, make sure to click the related action button before you leave the page. If you go to another page without first clicking the action button, your changes are not saved.

4.4.3.5 Drop-down Lists

A drop-down list lets you choose from a list of selections. Left-click the drop-down button to open the list. Then, left-click on an item to select that choice.

4.4.3.6 Text or Data Entry

Text boxes let you type data into a field. An action button can be associated with a single text box, or a group of text boxes.

For any text box, left-click anywhere inside the box and type the desired data into that field. Make sure to press **ENTER** when done typing.

Click the related action button to save the data.

4.4.4 Home Pages

4.4.4.1 Home | Home

Use this page to identify the product. Click the **Home** navigation tab or the page hyperlink to return to this page from anywhere in the Web Server Interface.

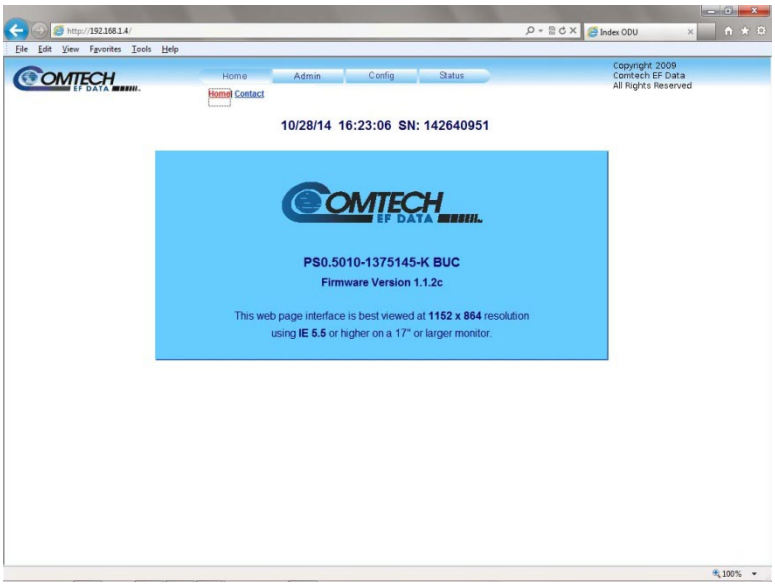


Figure 4-1. LPOD-R .5 Unit Home Page

4.4.4.2 Home | Contact / Home | Support pages

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

4.4.5 Admin Pages

The Admin pages are available only to users who have logged in using the Administrator Name and Password.

Use these administrator pages to set up user access.

4.4.5.1 Admin | Access

Refresh the page to see the latest data.

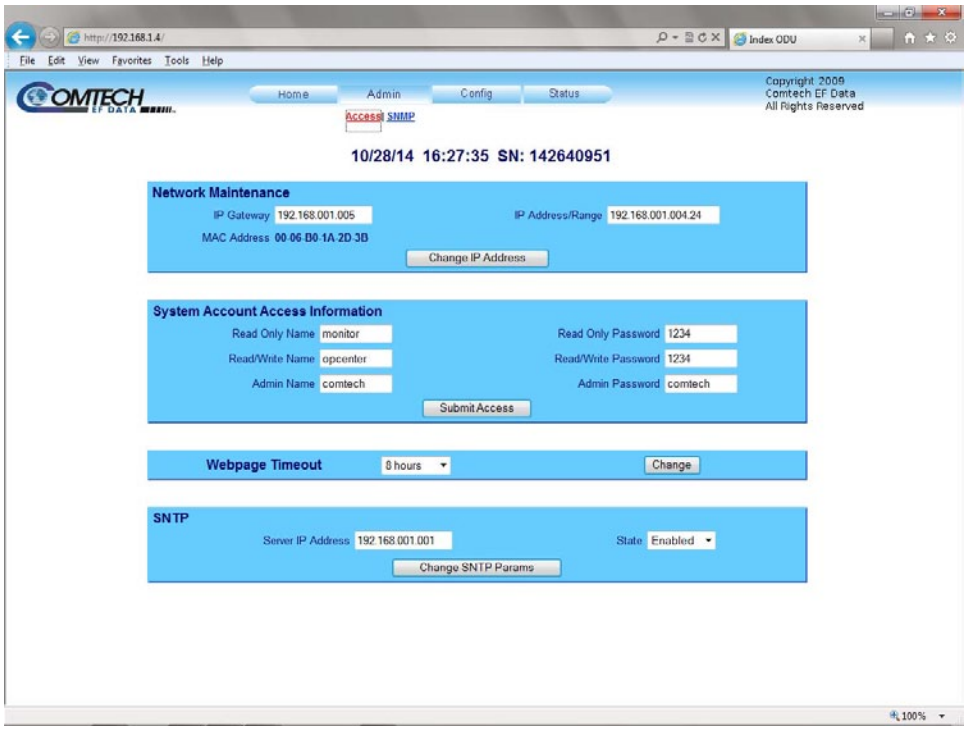


Figure 4-2. Admin | Access Page

Network Maintenance

- **IP Gateway, IP Address/Range** – Enter the desired IP Gateway Address and IP Address/ Range in these text boxes.

- **MAC Address** (read-only) – The MAC is set at the factory to a guaranteed unique address that you cannot modify.

Click **Change IP Address** to save any changes.

System Account Access Information

Name fields can be any alphanumeric combination with a maximum length of 10 characters. **Password** fields can be any alphanumeric combination with a maximum length of 10 characters.

- **Admin, Read/Write, and Read Only Names and Passwords** – The factory defaults for these names/passwords are:
  - **Admin** comtech/comtech
  - **Read/Write** opcenter/1234
  - **Read Only** monitor/1234

Click **Submit Access** to save any changes.

Webpage Timeout

The Webpage Timeout sets the time period that can pass before the Web Server Interface pages time out.

- Use the drop-down list to select **5 minutes** (default) or **8 hours**.
- Click **Submit**.

The **Status | Status** page automatically refreshes once every ten seconds, and resets the timeout counter.

SNTP

- **Server IP Address** – Specify the SNTP server IP Address.
- **State** - Use the drop-down to select **Enable** or **Disable**.

Click **Change SNTP Params** to save these settings.

4.4.5.2 Admin | SNMP

The Administrator must use this page to manage LPOD-R SNMP (Simple Network Management Protocol) settings. Refresh the page to see the latest data.

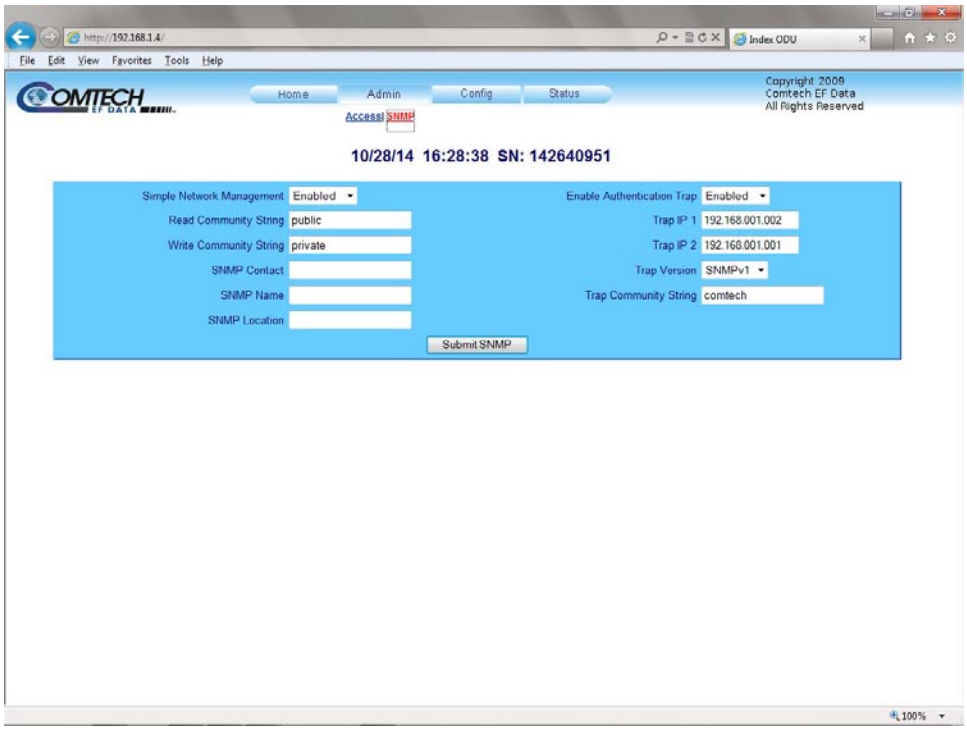


Figure 4-3. Admin | SNMP Page

- **Simple Network Management** – Use the drop-down list to select **Enabled** or **Disabled**.
- The **Read Community String** and **Write Community String** fields can be any combination of characters and a length of 0 to 20 characters.
  - **Read Community String** factory default is **public**.
  - **Write Community String** factory default is **private**.
- **SNMP Contact** – Enter the contact data.
- **SNMP Name** – Enter the name.
- **SNMP Location** – Enter the location.
- **Enable Authentication Trap** – Use the drop-down list to select **Enabled** or **Disabled**.
- The Administrator can assign up to two **SNMP Trap IP** addresses.
- **Trap Version** – Use the drop-down list to select the version.
- The **SNMP Trap Community String** field can be any combination of characters and a length of 0 to 20 characters. The factory default for the **SNMP Trap Community String** is **comtech**.

Click **Submit SNMP** to save any changes.

4.4.6 Config Pages

Use the **Configuration** pages to configure all operating parameters for the LPOD-R.

4.4.6.1 Config | Amplifier

Use this page to configure the communications, operations and alarms/faults handling for the amplifier. Refresh the page to see the latest data.

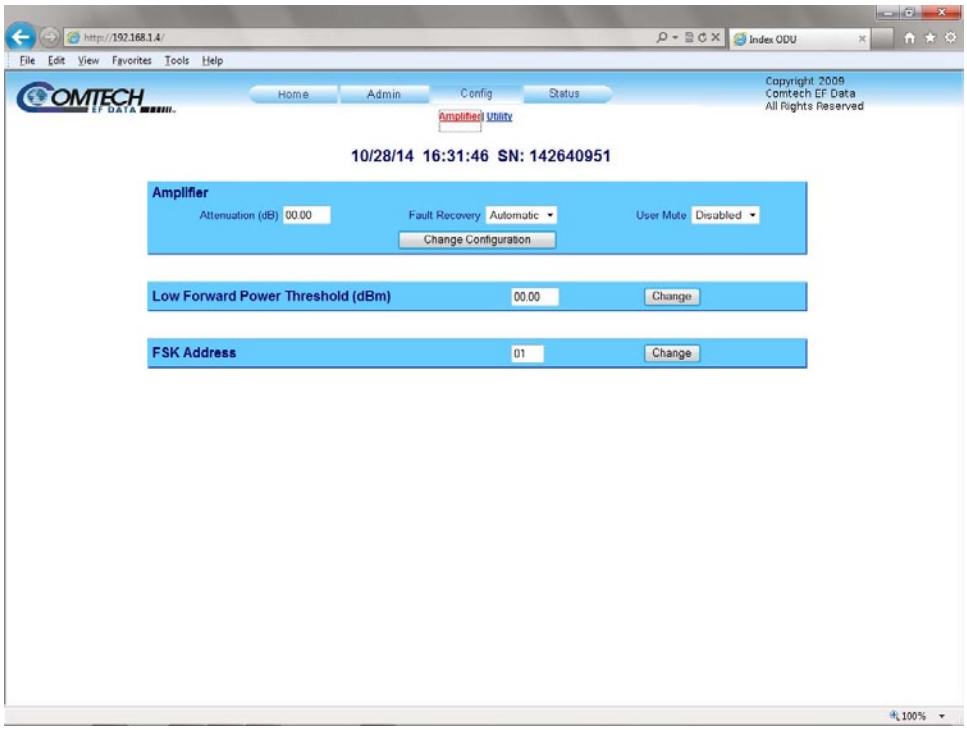


Figure 4-4. Config | Amplifier Page

Amplifier

- **Attenuation (dB)** – Enter a valid attenuation level (**00.00** to **20.00** dB) in 0.25 dB steps.
- **Fault Recovery** – Use the drop-down list to select **Automatic** or **Manual**.
- **User Mute** – Use the drop-down list to select **Enabled** or **Disabled**.

Click **Change Configuration** to save any changes.

Low Forward Power Threshold (dBm)

Set the threshold value, in dBm, for the low forward power alarm/fault.

When the forward power monitor is set to **Alarm** or **Fault** instead of the factory default of **Mask**, and the forward power drops below the specified value, the alarm/fault occurs.

To disable the threshold, set this parameter to the default value of 00.00.

Click **Change** to save any changes.

FSK Address

Set the FSK (Frequency Shift Keying) Address from **01** to **15**.

Click **Change** to save any changes.

4.4.6.2 Config | Utility

Use this page to configure additional LPOD-R operating parameters. Refresh the page to see the latest data.

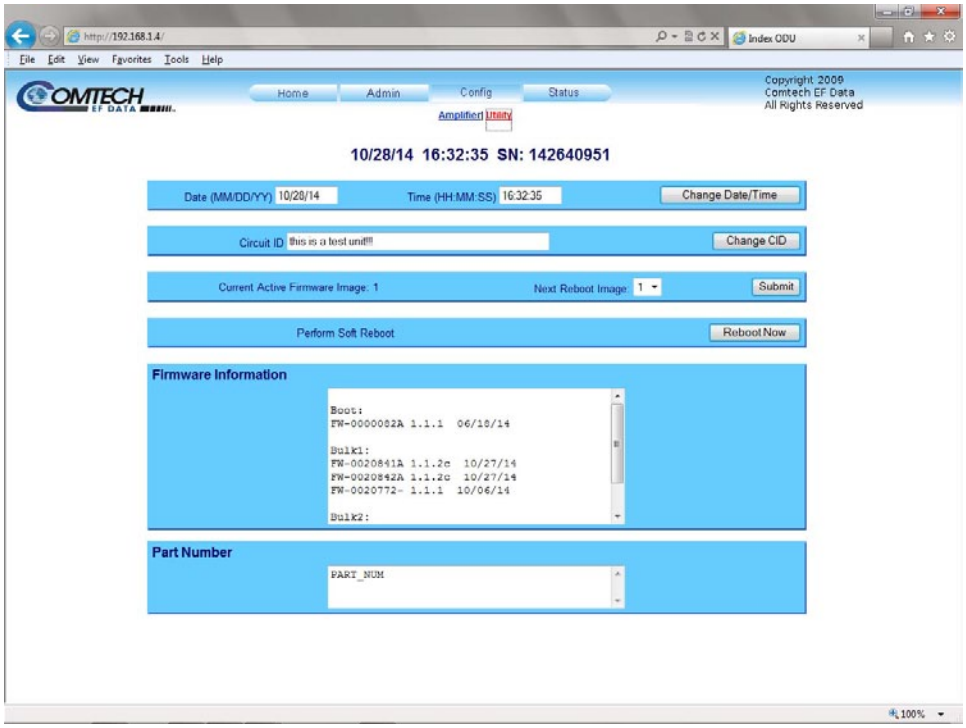


Figure 4-5. Config | Utility Page

Date and Time

- Enter a date using international format in the form DD/MM/YY (where DD = day [01 to 31], MM = month [01 to 12], and YY = year [00 to 99]).

- Enter a time using HH:MM:SS format (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]).

Click **Change Date/Time** to save the changes.

Circuit ID

Enter a **Circuit ID** string of up to 48 characters. This is the identification label for the unit.

Click **Change CID** to save the change.

Current Active Firmware Image # (read-only)

The selected **Current Active Firmware Image** is shown here. In this example, **Image 1** is the **Current Active Firmware Image**.

Next Reboot Image

Use the drop-down list to select the Next Reboot Image as **Image 1** or **2**.
Click **Submit** to save the change.

Perform Soft Reboot

Click **Reboot Now** to reboot the LPOD-R using the **Current Active Firmware Image**.

Firmware Information (read-only)

This **read-only** window shows information about the currently loaded Bootrom. For the complete Bulk1 and Bulk2 information, scroll through all the constituent firmware blocks that make up the bulk.

Part Number (read-only)

This **read-only** window shows part number information for the unit.

4.4.7 Status Pages

Use these pages to see the unit's operational status, logged alarm and statistics windows.

4.4.7.1 Status | Summary

This read-only page shows a summary of information about the LPOD-R unit and its current operating state. Refresh the page to see the latest data.

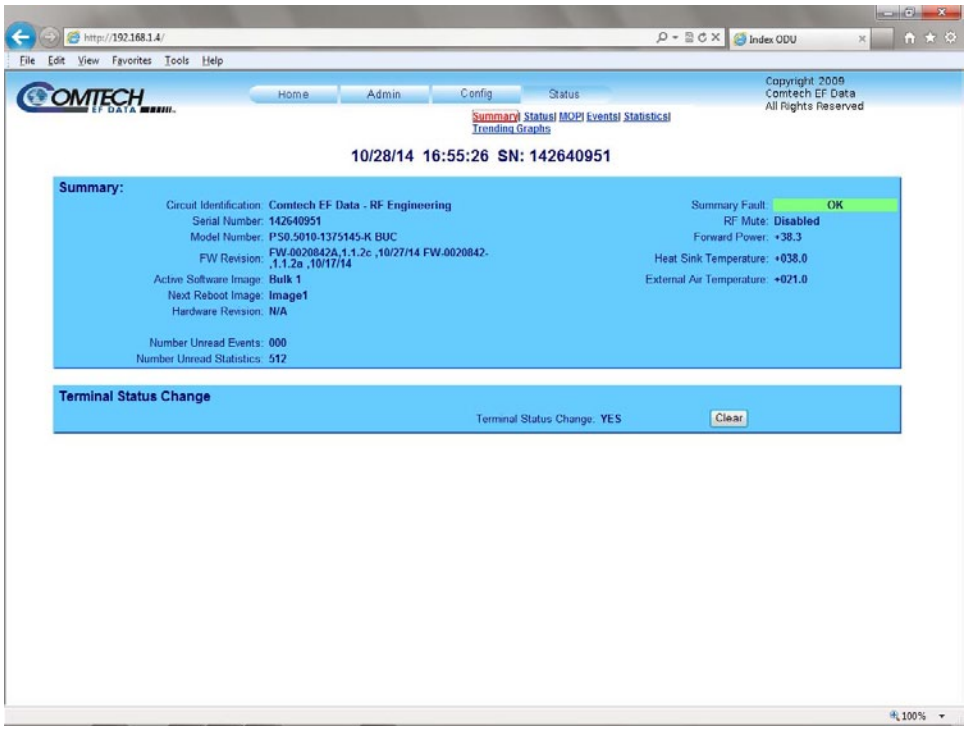


Figure 4-6. Status | Summary Page

Summary (read only)

The **Summary Fault** message shows **OK** on a green background if no faults are present. If a fault exists, the message changes to **FAULT** on a red background. Should this occur, look at the logged faults and alarms on the **Status | Events** page.

Terminal Status Change

If **Terminal Status Change** shows **NO**, there have been no changes in the unit's configuration since the last time the **Terminal Status Change** status was cleared.

If **Terminal Status Change** shows **YES**, a status change had occured for one or more of these reasons:

- An operating parameter changed, (e.g., when a command changes an operational value)
- A fault condition occurs
- A redundant switchover occurs

To reset the **Terminal Status Change** from **YES** to **NO**, click **Clear**.

4.4.7.2 Status | Status

Use this read-only page see general status data for the LPOD-R.

Unlike the pages that you must refresh manually, the **Status | Status** page updates automatically once every 10 seconds. You can still refresh the page manually, if desired.

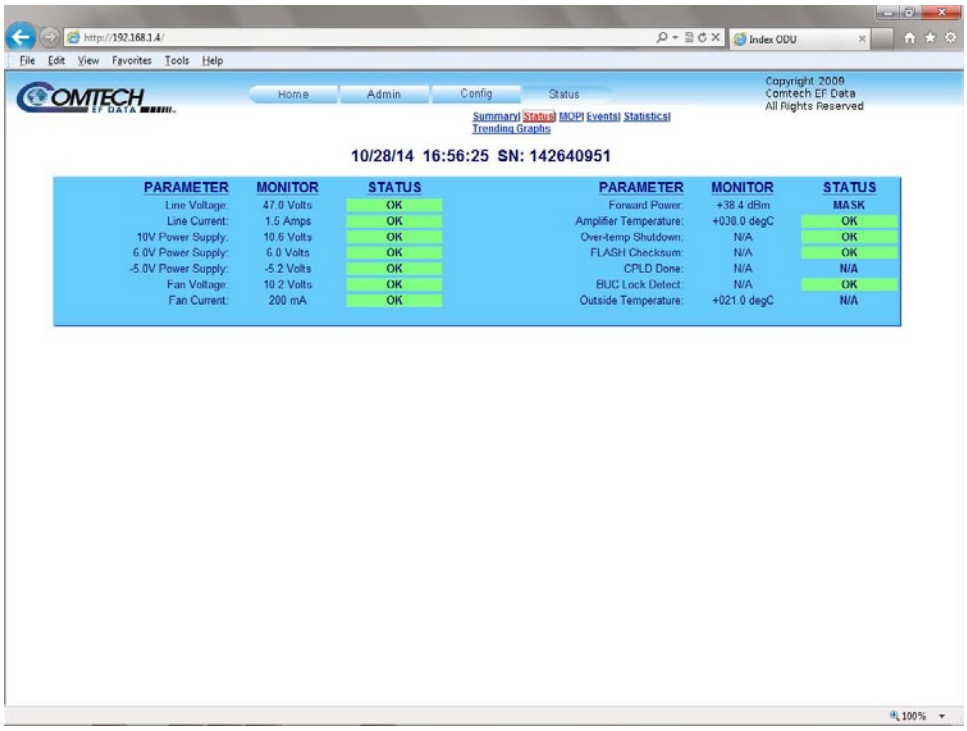


Figure 4-7. Status | Status Page

4.4.7.3 Status | MOP

Use this read-only page to see details of the unit's **Maximum Operating Point** (MOP) data. Refresh the page to see the latest data.

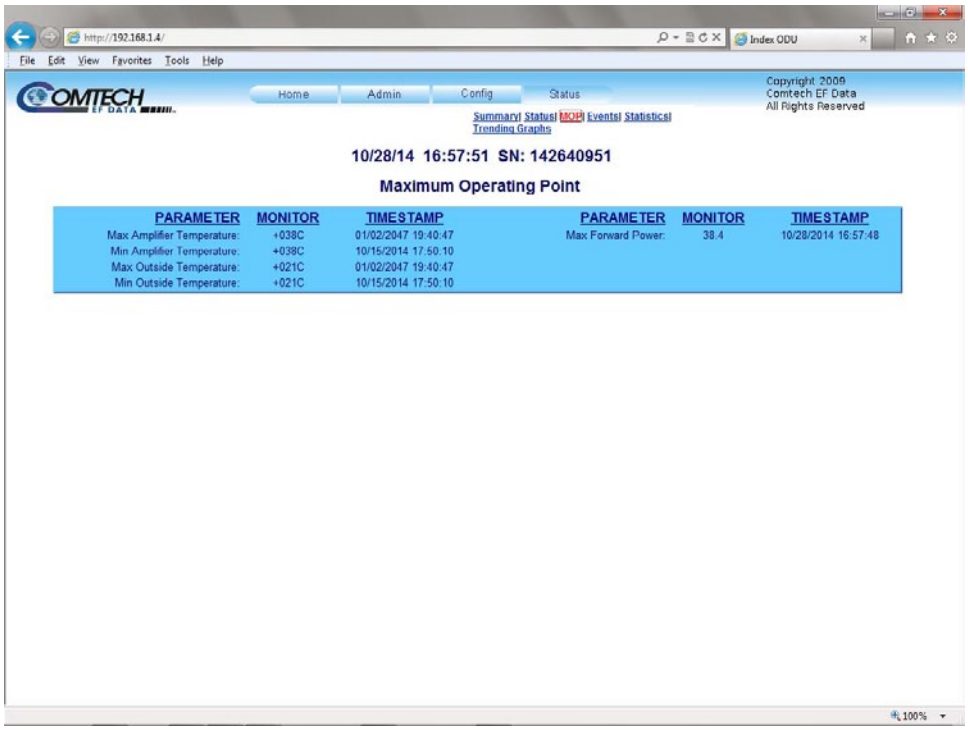


Figure 4-8. Status | MOP Page

4.4.7.4 Status | Events

Use this page to see stored events data. Additionally, use it to set the parameters for how the LPOD-R triggers events and alarms. Refresh the page to see the latest data.

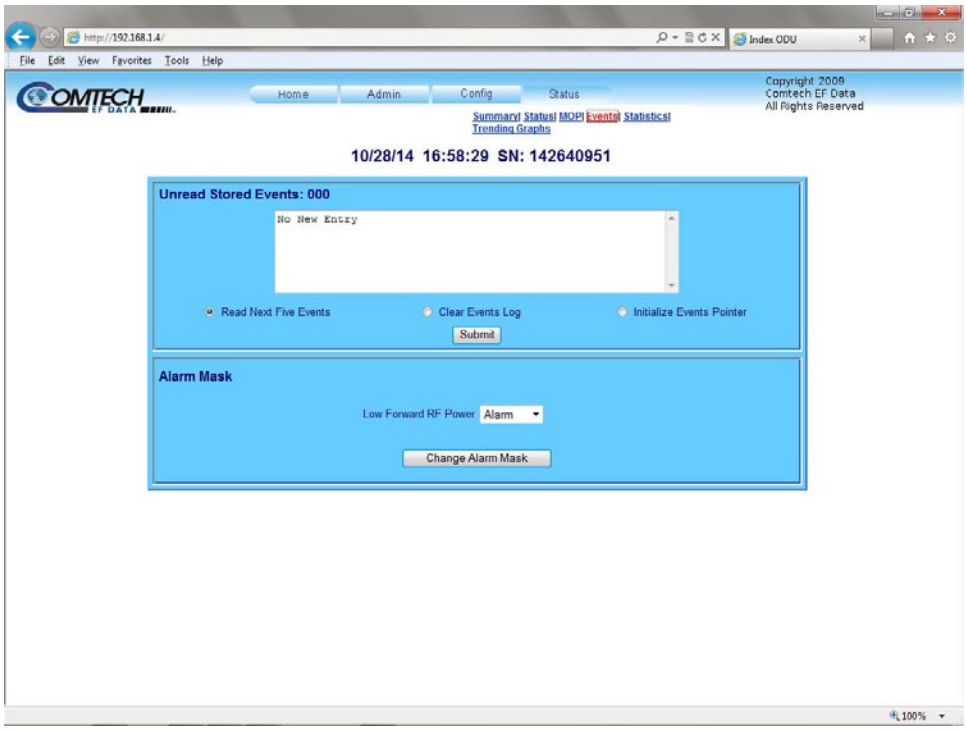


Figure 4-9. Status | Events Page

Unread Stored Events

This window shows the unread stored events log in sequential, date-stamped format. The unit shows the five oldest stored events in the alarm log. A running tally of the number of unread stored events shows in the window header. All events that are read from the log are removed from the log automatically.

- Select **Read Next Five Events** to show the next five unread stored events in the log.
- Select **Clear Events Log** to clear all stored events from the log.
- Select **Initialize Events Pointer** to reset the internal pointer to allow queries to start at the beginning of the stored events log.

Click **Submit** to update the window according to your selection.

Alarm Mask

Use the drop-down list to select the **Low Forward RF Power** alarm as **Fault**, **Alarm,** or **Masked**.

Click **Change Alarm Mask** to save these settings.

4.4.7.5 Status | Statistics

This page shows all unread, stored statistics. Use it to configure how the LPOD-R handles and shows statistics. Refresh the page to see the latest data.

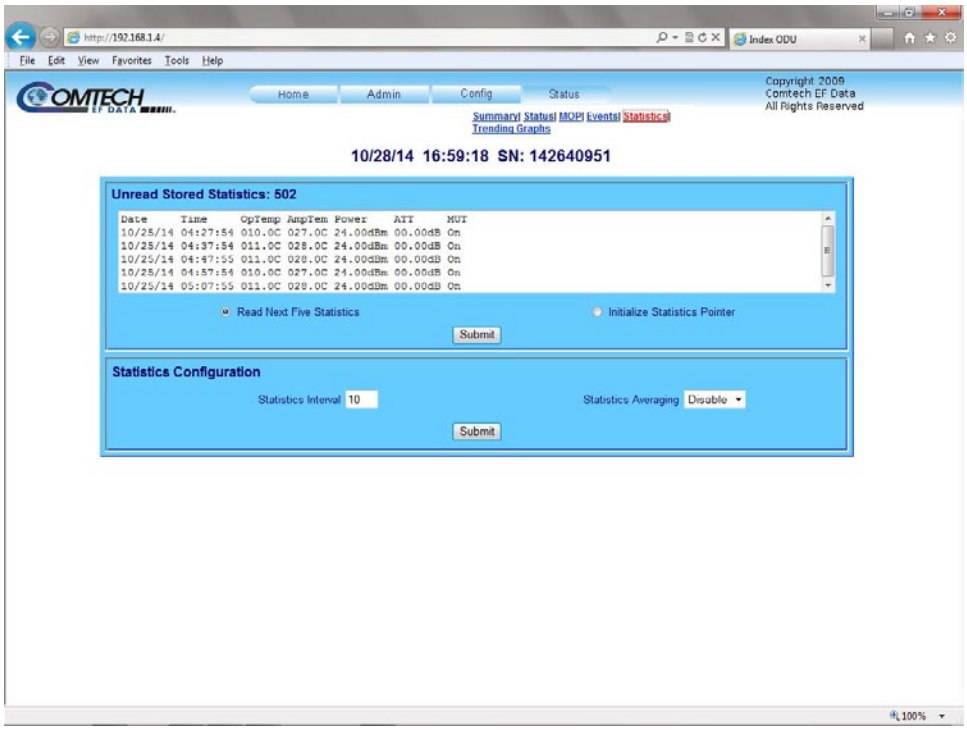


Figure 4-10. Status | Statistics Page

Unread Stored Statistics:

This window shows the unread stored statistics log in sequential, date-stamped format. This page shows a running tally of the number of unread stored statistics in the window header. The unit shows the five oldest stored statistics. All events that are read from the log are removed from the log automatically.

- Select **Read Next Five Statistics** to cause the unit to return the oldest five unread stored statistics that remain unread in the log. If fewer than five events are available for retrieval, the remaining positions are padded with zeros. If there are no new events, the counter in the header reads **000**.
- Select **Initialize Statistics Pointer** to reset the internal pointer to allow queries to start at the beginning of the statistics log.

Click **Submit** to update the window according to your selection.

Statistics Configuration

- **Statistics Interval** – Enter the interval at which statistics are logged. The interval is set in minutes. Minimum resolution is 1 minute (001); maximum is 99 minutes (099). Default is 90 minutes (090).
- **Statistics Averaging** – Select **Enable** or **Disable** to set the **Statistics Averaging** function:

- If **Enabled**, statistics data is averaged at a rate of once per second for 10 seconds.
- If **Disabled**, burst values are logged instead of averaged values.

Click **Submit** to save the changes.

4.4.7.6 Status | Trending Graphs

Use this page to see graphs showing trends over time for several operating parameters. You can select the time settings for the graph also. Graphed operating parameters include:

- Amplifier Temperature
- Amplifier Output Power
- Line Voltage
- Line Current (Amp)
- Fan Voltage
- Fan Current (mA)

Refresh the page to see the latest data.

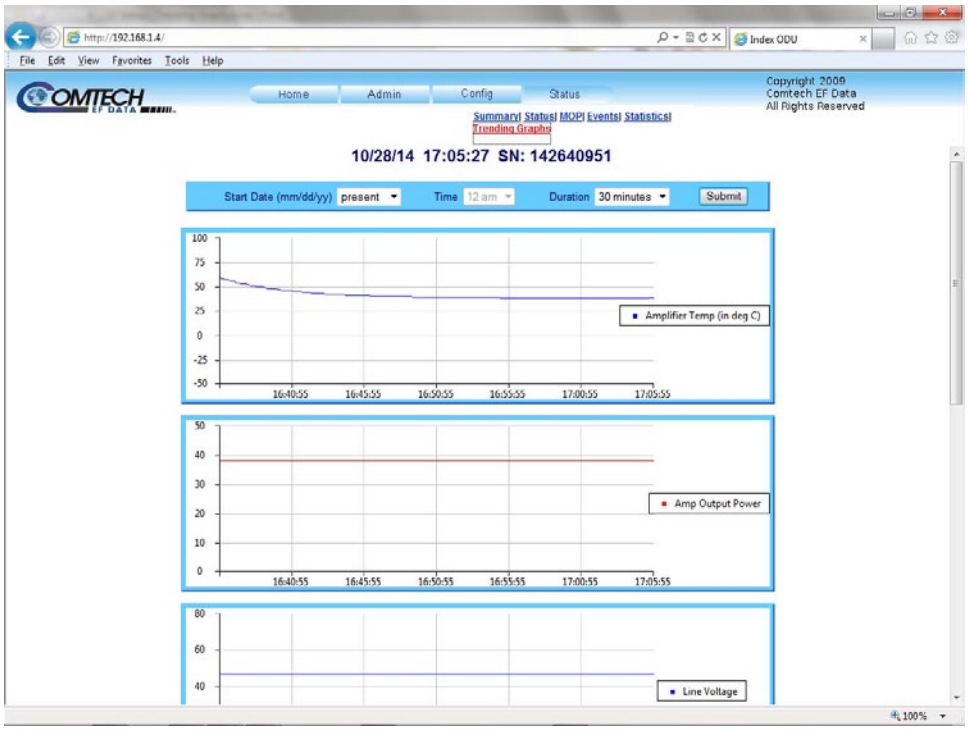


Figure 4-11. Status | Trending Graphs Example

Trending Graph Time Settings

- **Start Date (mm/dd/yy)** – Use the drop-down list to select **present** or a specific date.
- **Time** – If the **Start Date** is a specified date, select the starting **Time** for that date.
- **Duration** – Use the drop-down list to select a duration period for the graph statistics.

Click **Submit** to save the new settings.

Use the page scroll bar to see all of the trending graphs.

Figure 4-12. Status | Trending Graphs Example, continued

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Chapter 5. OPTIONAL SERIAL-BASED REMOTE PRODUCT MANAGEMENT

NOTE: To ensure optimal performance and to access the most current remote commands and queries, it is important to operate the LPOD-R with its latest available firmware.

5.1 Overview

Optional Serial-based remote product management of Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) is available using the LPOD-R PS 1 or PS 1.5's **J6 | COM1** 19-pin communications port. This chapter summarizes key parameters and procedures and their associated remote commands and queries, and provides detailed instructions for use of the serial remote control communication command and query interface.

5.2 Key Operational Parameters / Common Commands and Queries)

For detailed information about the remote commands and queries mentioned here, see Section 5.4.
Key operational parameters and their associated remote commands and queries are as follows:

- ATT – ATTenuator control. Execute the ATT command to attenuate the LPOD-R gain over its specified range.

- MUT – MUTe status. Execute the MUT command to “software” mute the unit.

- RMS – Retrieve Maintenance Status. Use this query to display voltages, fan speeds, heatsink temperature, output power monitor reading, etc.

  A power detector is provided to monitor the output power. It has a useful range of over 15 dB, referenced to the unit’s rated P1dB point. Execute the RMS query to read its value.

- RCS – Retrieve Configuration Status. This query displays the current attenuation, mute, amplifier, online, etc. status.

- RAS – Retrieve Alarm Status. Execute the RAS query to read the unit’s current fault or alarm condition status.

  The M&C system monitors certain key functions of the LPOD-R for proper operation. Should any of these parameters exceed predetermined limits, the M&C system declares a fault. All fault conditions cause the status LED to illuminate RED and the unit to mute.

  The conditions that trigger a fault are:

  - BUC PLL Unlocked Fault – This fault is asserted when the LO PLL is unable to lock to the 10 MHz input reference. The fault is de-asserted when the LO PLL locks to the input reference.

  - Thermal Shutdown Fault – This fault is asserted if the heatsink temperature exceeds +95°C. A 10°C hysteresis margin is employed; the fault is therefore de-asserted when the heatsink temperature drops lower than +85°C.

  - Unaccepted Firmware Fault (UFF) – This fault is asserted if you reject the running active firmware image (i.e., when you execute the FAR=R command), or when you do not promptly accept the firmware when running a new active firmware image.

    The UFF is de-asserted once you accept the new firmware (i.e., when you execute the FAR=A command).

5.2.1 End-of-Life Commands

Certain commands/queries are being marked by Comtech EF Data as End-of-Life (EOL). Flagged *<description>*^{E} in the Parameter Type column (in the Remote Commands and Queries tables in Sect. 5.4), while these commands/queries are fully supported in the LPOD-R, Comtech EF Data strongly recommends that you use their new equivalents for new implementations.

EOL-designated Command/Query (Page #)	New Command/Query (Page #)	Remarks
CAA (5-9)	CAE (5-9)	–
CUS (5-12)	N/A	This functionality is not included in any other remote command/query
DAT (5-12)	DAY (5-13)	–
LNA (5-15)	RNE (5-21)	–
RET (5-20)	PNM (5-18)	The replacement query provides more exact unit hardware information
RSN (5-23)	SNO (5-23)	–

5.3 Remote Control Protocol and Structure

The electrical interface is either an EIA-485 multi-drop bus (for the control of many devices) or an EIA-232 connection (for the control of a single device), and data is transmitted in asynchronous serial form, using ASCII characters. Control and status information is transmitted in packets, of variable length, in accordance with the structure and protocol defined in later sections.

5.3.1 EIA-485

For applications where multiple devices are to be monitored and controlled, a full-duplex (or 4-wire) EIA-485 is preferred. Half-duplex (2-wire) EIA-485 is possible, but is not preferred.

In full-duplex EIA-485 communication there are two separate, isolated, independent, differential-mode twisted pairs, each handling serial data in different directions. It is assumed that there is a Controller device (a PC or dumb terminal), which transmits data, in a broadcast mode, via one of the pairs. Many Target devices are connected to this pair, which all simultaneously receive data from the Controller. The Controller is the only device with a line-driver connected to this pair – the Target devices only have line-receivers connected.

In the other direction, on the other pair, each Target has a Tri-Stateable line driver connected, and the Controller has a line-receiver connected. All the line drivers are held in high-impedance mode until one (and only one) Target transmits back to the Controller.

Each Target has a unique address, and each time the Controller transmits, in a framed packet of data, the address of the intended recipient Target is included. All of the Targets receive the packet, but only one (the intended) will reply. The Target enables its output line driver, and transmits its return data packet back to the Controller, in the other direction, on the physically separate pair.

EIA-485 (Full Duplex) Summary:	
Two differential pairs	One pair for Controller to Target, one pair for Target to Controller.
Controller-to-Target pair	Pair has one line driver (Controller), and all Targets have line-receivers.
Target-to-Controller pair	Pair has one line receiver (Controller), and all Targets have Tri-State drivers.

5.3.2 EIA-232

This is a much simpler configuration in which the Controller device is connected directly to the Target via a two-wire-plus-ground connection. Controller-to-Target data is carried, via EIA-232 electrical levels, on one conductor, and Target-to-Controller data is carried in the other direction on the other conductor.

5.3.3 Basic Protocol

Whether in EIA-232 or EIA-485 mode, all data is transmitted as asynchronous serial characters, suitable for transmission and reception by a UART. The character format should be 8N1 (8 data bits, no parity, 1 stop bit). The baud rate may vary from 2400 to 38400 baud.

All data is transmitted in framed packets. The Controller is assumed a PC or ASCII dumb terminal, which is in charge of the process of monitor and control. The Controller is the only device that is permitted to initiate, at will, the transmission of data. Targets are only permitted to transmit when they have been specifically instructed to do so by the Controller.

All bytes within a packet are printable ASCII characters, less than ASCII code 127. In this context, the Carriage Return and Line Feed characters are considered printable.

All messages from Controller-to-Target require a response – with one exception. This will be either to return data that has been requested by the Controller, or to acknowledge reception of an instruction to change the configuration of the Target. The exception to this is when the Controller broadcasts a message (such as Set time/date) using Address 0, when the Target is set to EIA-485 mode.

5.3.4 Packet Structure

Controller-to-Target						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
< ASCII code 60 (1 character)	0-9 ASCII codes 48-57 (4 characters)	/ ASCII code 47 (1 character)	A-Z, a-z ASCII codes 65-90, 97-122 (3 characters)	= *or* ? ASCII codes 61 or 63 (1 character)	 (n characters)	Carriage Return ASCII code 13 (1 character)

Example: <0412/MUT=1{CR}

Target-to-Controller						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
> ASCII code 62 (1 character)	0-9 ASCII codes 48-57 (4 characters)	/ ASCII code 47 (1 character)	A-Z, a-z ASCII codes 65-90, 97-122 (3 characters)	=, ?, !, *or* * ASCII codes 61,63,33 or 42 (1 character)	(From 0 to n characters)	Carriage Return, Line Feed ASCII codes 13,10 (2 characters)

Example: >0412/MUT=1{CR}{LF}

5.3.4.1 Start of Packet

These characters are used to provide a reliable indication of the start of packet. They must not appear anywhere else in the body of the message:

- Controller-to-Target: < (ASCII code 60)
- Target-to-Controller: > (ASCII code 62)

5.3.4.2 Target Address

Up to 9,999 devices can be uniquely addressed. In EIA-232 applications, this value is set to 0. In EIA-485 applications, the permissible range of values is 1 to 9999.

The Controller sends a packet with the address of a Target – the destination of the packet. When the Target responds, the address used is the same address, to indicate to the Controller the source of the packet. The Controller does not have its own address.

5.3.4.3 Address Delimiter

- Forward slash character: **/** (ASCII code 47)

5.3.4.4 Instruction Code

This three-character alphabetic sequence is intended to be a mnemonic of its operational function. This aids in the readability of the message, should you display it in its raw ASCII form.

For Example: GAC means Global Amplifier Configuration; IPA means IP Address, etc.

Both upper case and lower case alphabetic characters may be used (A-Z *and* a-z, ASCII codes 65-90 *and* 97-122).

5.3.4.5 Instruction Code Qualifier

This single character further qualifies the preceding instruction code. Code Qualifiers obey the following rules:

From **Controller-to-Target**, the instruction code qualifiers are:

= (ASCII code 61	This qualifier is used as the command (assignment) operator that instructs that the preceding instruction code should be set to the value of the argument(s) that follow. For example: MUT=1 means ‘set the Mute function to Enabled’.
? (ASCII code 63)	This qualifier is used as the query operator that instructs the Target to return (report) to the Controller the current set value for the parameter defined by the preceding instruction code. For example: SWR? means ‘return the firmwares installed in the Active and Pending images’.

From **Target-to-Controller**, the instruction code qualifiers are:

= (ASCII code 61)	This qualifier displays in two ways: 1. First, if the Controller issues a command to set a parameter to a particular value, and the sent argument value is valid, then the Target accepts the command by replying with, for example, MUT= (with no message arguments). 2. Second, if the Controller issues a query to a Target (for example, MUT?, meaning '*is the Mute enabled or disabled?*'), then the Target responds to the query with MUT=x (where 'x' represents the configured state – e.g., '1' being 'enabled' and '0' being 'disabled').
? (ASCII code 63)	This qualifier displays only if the Controller issues a command to set a parameter to a particular value, but the sent argument value is not valid. The Target rejects the command and responds to the error by echoing the instruction code, followed by the '?' qualifier, with no message arguments. Example: MUT?
! (ASCII code 33)	This qualifier displays only if the Controller issues an instruction code that the Target does not recognize. The Target rejects the instruction code and responds to the error by echoing the invalid instruction code, followed by the '!' qualifier, with no message arguments . Example: XYZ!
* (ASCII code 42)	This qualifier displays only if the Controller issues a command to set a parameter to a particular value but – even though the argument value is valid – the Target is in the wrong mode (e.g., Local mode instead of Remote mode) and does not permit that particular parameter to be changed at that time. The Target rejects the command and responds to the error by echoing the instruction code, followed by the '*' qualifier, with no message arguments. Example: MUT*
# (ASCII code 35)	This qualifier displays only if the Controller sends an instruction code that the Target cannot currently perform due to hardware resource issues – specifically, if you issue two or more 'hardware configuration' type commands without allowing adequate time, between commands, for the hardware to be configured. If this happens, the Target rejects the instruction code and responds to the error by echoing the invalid instruction, followed by the # character. For example, if you issue commands to change both the frequency (FRQ=) and the attenuation (ATT=) with less than 100 milliseconds between the commands, and the Target responds with ATT#, this means that the attenuation command was rejected and you must resend that command.

5.3.4.6 Optional Message Arguments

Arguments are not required for all messages. Arguments are ASCII codes for any printable character.

5.3.4.7 End of Packet

- Controller-to-Target: This is the carriage return character (ASCII code 13).
- Target-to-Controller: This is the two-character sequence of carriage return (ASCII code 13) and line feed (ASCII code 10).

Both indicate the valid termination of a packet.

5.4 Remote Commands and Queries

Column C = Command; Column Q = Query; columns marked X designate instruction code as *Command only*, *Query only*, or *Command/Query*.

Where an Instruction Code is noted in this table as XXX[E] (and where the Parameter Type column is in the format <*description*>[E]), this denotes the command/query as End of Life (EOL). See Sect. 5.2.1 for more information.

CODE	C	Q	PAGE
AFR	X	X	5–9
ATT	X	X	5–9
CAA[E]	X		5–9
CAE	X		5–9
CAS		X	5–10
CCS		X	5–11
CID	X	X	5–11
CMS		X	5–12
CUS[E]		X	5–12
DAT[E]	X	X	5–12
DAY	X	X	5–13
ESA	X	X	5–13

CODE	C	Q	PAGE
FAR	X	X	5–13
FRW		X	5–14
GAC	X	X	5–14
IEP	X		5–14
IPA	X	X	5–15
IPG	X	X	5–15
ISP	X		5–15
LNA[E]		X	5–15
LPT	X	X	5–16
LRS	X	X	5–16

CODE	C	Q	PAGE
MAC		X	5–17
MSK	X	X	5–17
MUT	X	X	5–17
NUE		X	5–18
NUS		X	5–18
PNM		X	5–18
RAS		X	5–18
RBT	X		5–19
RCS		X	5–19
RET[E]		X	5–20
RMS		X	5–20
RNE		X	5–21
RNS		X	5–22
RSN[E]		X	5–23
RUS		X	5–23

CODE	C	Q	PAGE
SFA	X	X	5–23
SNO	X	X	5–23
SSI	X	X	5–23
SWR		X	5–23
TIM	X	X	5–24
TMP		X	5–24
TSC	X	X	5–24

Note: The following codes are used in the 'Response to Command' column:

CODE	MEANING
=	Message OK
?	Received OK, but invalid arguments found
*	Message OK, but not permitted in Current mode
#	Message OK, but only permitted in Remote mode
!	Unknown command

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Auto Fault Recovery	AFR=	1 byte	Command or Query. Enables or disables Auto Fault Recovery. The LPOD output is automatically muted if any of the following fault conditions occur: BUC lock detect fault, LNB current fault (see Note), or LNB voltage fault (see Note). If enabled, auto fault recovery causes the output to return to its pre-fault mute condition if all faults are cleared. If disabled, the output remains muted even if all faults are cleared. Command/query is in the form x, where: 0 = Disable 1 = Enable Default Value: 1 Example: <1/AFR=1'cr' >0001/AFR='cr''lf' Note: This fault can be user-defined as fault, alarm, or masked (see MSK command for more info).	AFR= AFR? AFR*	AFR?	AFR=x (Same format as command arguments)
Attenuation	ATT=	5 bytes	Command or Query. Sets or returns the attenuation level, in dB, in the form xx.xx, where: xx.xx = 00.00 to 20.00 in 0.25 dB steps. Default Value: 10.00 Example: <1/ATT=12.25'cr' >0001/ATT='cr''lf'	ATT= ATT? ATT*	ATT?	ATT=xx.xx (Same format as command arguments)
Clear All Stored Alarms[E]	CAA=	None	Command only. Instructs the unit to clear all Stored Alarms. This command takes no arguments. Example: <1/CAA='cr' >0001/CAA='cr''lf'	CAA= CAA*	N/A	N/A
Clear All Stored Events	CAE=	None	Command only. Instructs the BUC to clear all Stored Events. This command takes no arguments. Example: <1/CAE='cr' >0001/CAE='cr''lf'	CAE= CAE*	N/A	N/A

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Alarm Status Concise Alarm Status (cont)	N/A	44 bytes	Query only. Returns the Alarm status of the unit. This is the concise version of the RAS command, response is semicolon delimited, in the form a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s;t;u;v;w;x;y;z;aa'cr''lf' where: a thru z = 0, 1, 2, 3, 4, or 5 0 = FT 1 = OK 2 = AL 3 = NO 4 = YS 5 = MS a = LINEV b = LINEA c = LNB Power Supply (N/A) d = +13.5V Power Supply (N/A) e = +10V Power Supply f = +10V1 Amplifier Power Supply g = +10V2 Amplifier Power Supply (N/A) h = +7.8V Power Supply (N/A) i = +5.8V Power Supply j= +2.5V Power Supply (N/A) k = +1.2V Power Supply l = -5V Power Supply m = Fan1V n = Fan1A o = Heatsink Temp p = Overtemp Shutdown q = IIC Status r = Forward Power Alarm s = Flash Checksum t = FPGA Done (N/A) u = BUC Lock Detect v = External Ref Lock Detect (N/A) w = LNB Current (N/A) x = Redundant Switch Condition (N/A) y = Redundant Link Status (N/A) z = Terminal Status Change aa = Unaccepted Firmware Note: Field values appear only if the appropriate model/options are selected/installed. Otherwise, the unused fields display NA.	CAS=	CAS?	CAS=x….x (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Configuration Status	N/A	26 bytes	Query only. Returns the configuration status of the unit. This is the concise version of the RCS command, response is semicolon delimited in the form aa.aa;b;c;d;e;ff.ff;g;hhh; 'cr''lf' where: aa.aa = attenuation in dB (ATT) b = RF power amplifier state (AMP): 0 = Off 1 = On c = mute state (MUT): 0 = unmuted 1 = muted d = online status (ONL) e = redundancy state and mode (ESW) ff.ff = Attenuator offset in dB (AOF) g = auto fault recovery mode (AFR) hhh = External reference status: N/A = no external reference 05M for 5 MHz 10M for a 10 MHz (see Note) Note: hhh is always N/A if the internal reference oscillator option is not installed.	CCS=	CCS?	CCS=x….x (See Description of Arguments for details)
Circuit Identification	CID=	48 bytes	Command or Query. Sets or returns a user-defined string of data that may be used to identify or name the unit or station. The CID is a 48-byte field of data that is entered as one line, but it is read back from the unit as two 24-byte lines of data. Default Value: ------CID MESSAGE------- ---------- Example 1: <1/CID= Station #001--SSPA #01--'cr' >0001/CID= Example 2: <1/CID?'cr' >0001/CID='cr' Station #001'cr' --SSPA #01--'cr''lf'	CID= CID? CID*	CID?	CID=x…x (See Description of Arguments for details.)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Maintenance Status	N/A	95 bytes	Query only. Returns the Maintenance status of the unit. This is the concise version of the RMS command, response is semicolon delimited in the form aaa.a;bbb.b;ccc.c;ddd.d;eee.e;fff.f;ggg.g;hh.h;iii.i;jjj.j;kkk.k;lll.l;mmm.m; nnn.n;ooo.o;ppp.p; qqq.q; rrr.r;sss.s;ttt.t;'cr''lf' where: aaa.a = LINEV bbb.b = LINEA ccc.c = LNBVT ddd.d = P13VT eee.e = P10V1 fff.f = A10V1 ggg.g = A10V2 hhh.h = P7V8T iii.i = P5V8T jjj.j = P2V5T kkk.k = P1V2T lll.l = N5V8T mmm.m = FAN voltage nnn.n = FAN current ooo.o = BUCVT ppp.p = FWPWR qqq.q = REFVT rrr.r = LNBCS sss.s = ATEMP ttt.t = OTEMP Note: Field values appear if the appropriate model/options are selected/installed. Otherwise, unused fields are padded with X's.	CMS=	CMS?	CMS=x….x (See Description of Arguments for details)
Concise Utility Status	N/A	15 bytes	Query only. Returns the Maintenance status of the unit, response is semicolon delimited in the form aaaa;bbbbb;ccc; 'cr''lf' where: aaaa = Remote Unit Address (unused) bbbbb = Remote Baud Rate (unused) ccc = Reference oscillator tuning voltage DAC value (unused) Note: Unused fields are padded with X's.	CUS=	CUS?	CUS=x….x (See Description of Arguments for details)
Set RTC (Real-Time-Clock) Date[E]	DAT=	6 bytes	Command or Query. Sets or returns the date in the form mmddyy, where: mm = month of the year, between 01 and 12 dd = day of the month, between 01 and 31 yy = year, between 00 and 96 (2000 to 2096) Example (date = April 24, 2013): <1/DAT=042413'cr' >0001/DAT='cr''lf'	DAT= DAT? DAT*	DAT?	DAT=mmddyy (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Set RTC (Real-Time-Clock) Date	DAY=	6 bytes	Command or Query. Sets or returns the date in the form ddmmyy, where: dd = day of the month, between 01 and 31 mm = month of the year, between 01 and 12 yy = year, between 00 and 99 (2000 to 2099) Example (date = April 24, 2013): <1/DAY=240413'cr' >0001/DAY='cr''lf'	DAY= DAY? DAY*	DAY?	DAY=ddmmyy (Same format as command arguments)
Enable Statistics Averaging	ESA=	1 byte	Command or Query. Enables or Disables averaging of statistics data at a rate of once per second for 10 seconds. If Disabled, burst values will be logged instead of averaged values. Command/query is in the form x, where: 0 = Disable 1 = Enable Default Value: 0 Example: <1/ESA=0'cr' >0001/ESA='cr''lf'	ESA= ESA? ESA*	ESA?	ESA=x (Same format as command arguments)
Firmware Accept / Reject	FAR=	1 byte	Command or Query. Accepts or Rejects the Active firmware Image in the form x, where: A= Accept R= Reject Example: <1/FAR=A'cr' >0001/FAR='cr''lf' Notes: 1) Accept forces the LPOD-R to de-assert the Unaccepted Firmware Fault (UFF) generated by upload of the Pending firmware Image to the Active firmware Image, and allows subsequent power-cycles/reboots to occur without affecting the firmware image. 2) Reject causes the image to be erased on the next power cycle/reboot, and instructs bootmgr to wait until a new firmware image load is FTPed into the Pending firmware Image.	FAR= FAR? FAR*	FAR?	FAR=x (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Firmware Number	N/A		Query only Returns the firmware type(s) loaded into the unit in the form FW-AAAAAAA B.B.BB MM/DD/YY, where: FW-AAAAAAA = the firmware part number B.B.BB = the version number MM/DD/YY = Month/Day/Year firmware released Example: <1/FRW?'cr' >0001/FRW='cr''lf' Activefirmware: FW-0020765;1.1.1mx;03/19/14 Pendingfirmware: PendingImage INVALID	FRW=	FRW?	FRW=Activefirmware:{CR}abc{CR}abc Pendingfirmware:{CR}abc{CR}abc (See Description of Arguments for details)
Global Amplifier Configuration	GAC=	43 bytes	Command or Query. Sets or returns the global status of the BUC/SSPA, response is semicolon delimited in the form a;b;cc.cc;dd.dd;e;fffff;g;hh;I;j;k;l;m;n;o;'cr' where: a = redundancy mode (ESW) b = online status (ONL) cc.cc = Attenuation Offset (AOF) dd.dd = Customer Attenuation(ATT) e = Auto Fault Recovery (AFR) fffff = Unit Alarm Mask (MSK) g = LNB Current Source (LCS) hh = LNB Current Window (LCW) i = LNB Current Window Enable (CWE) j = Enable Statistics Averaging (ESA) k = Set Statistics Interval (SSI) l = Enable Statistics Logging (ESL) m = Auxiliary Mute (AUX) n = user mute state (MUT) o = RF power amplifier state (AMP) Note: Unused fields are padded with X's.	GAC= GAC* GAC? GAC#	GAC?	GAC=x….x (See Description of Arguments for details)
Initialize Events Pointer	IEP=	None	Command only. Resets internal pointer to allow RNE? queries to start at the beginning of the stored events log. Example: <1/IEP='cr' >0001/IEP='cr''lf'	IEP= IEP? IEP*	N/A	N/A

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
IP Address	IPA=	18 bytes	Command or Query. Used to set the IP address and network prefix for the 10/100 BaseT Ethernet port, in the form xxx.xxx.xxx.xxx.yy, where: xxx.xxx.xxx.xxx = IP address yy = network prefix (8-30) Default Value: 192.168.001.004.24 Example: <1/IPG=192.168.001.004.24'cr' >0001/IPG='cr''lf' Note: Changing the IP address through the Telnet interface requires that you power cycle the unit, and then restart a new Telnet session with the new IP address (do not include the network prefix, e.g., type in 192.168.1.4 only)	IPA= IPA? IPA* IPA#	IPA?	IPA= xx.xxx.xxx.xxx.yy (See description of arguments)
Gateway Address	IPG=	15 bytes	Command or Query. Sets or returns the Gateway IP address for the 10/100 Base Tx Ethernet port, in the form xxx.xxx.xxx.xxx. Default Value: 192.168.001.005 Example: <1/IPG=192.168.001.005'cr' >0001/IPG='cr''lf'	IPG= IPG? IPG*	IPG?	IPG = xxx.xxx.xxx.xxx
Initialize Statistics Pointer	ISP=	None	Command only. Resets the internal pointer to allow RNS? queries to start at the beginning of the stored statistics log. Example: <1/ISP='cr' >0001/ISP='cr''lf'	ISP= ISP? ISP*	N/A	N/A
Retrieve next 5 unread Stored Alarms [E]	N/A	145 bytes	Query only. Returns the five oldest stored events in the alarm log in the form: YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr' YYYYYYYYYY ZZ mmddyy hhmmss'cr''lf' Where: YYYYYYYYYY = fault description. ZZ = one of the following event types: FT = Fault OK = Clear IF = Information mmddyy hhmmss = date / time stamp.	LNA=	LNA?	LNA=YY..ss (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve next 5 unread Stored Alarms [E] (cont)			Example: <1/LNA?'cr' >0001/LNA='cr' LOG CLR IF 175503 052307'cr' FAN #1 FT 175504 052307'cr' OVR TMP FT 175504 052307'cr' FAN #1 OK 175504 052307'cr' IIC BUS FT 175504 052307'cr''lf' Notes: 1) If there are no events in the log the unit will reply with LNA*. 2) All events that are read from the log are also automatically removed from the log.			
Low forward Power Threshold	LPT=	5 bytes	Command or Query. Sets or returns the threshold for the low forward power alarm/fault in the form xx.xx. Default Value: 00.00 Example: <1/LPT=00.00'cr' >0001LPT='cr''lf' Notes: 1) If there are no events in the log the unit will reply with LNA*. 2) All events that are read from the log are also automatically removed from the log. 3) Setting this parameter to 00.00 effectively disables the threshold	LPT = LPT? LPT *	LPT?	LPT =xx.xx (Same format as command arguments)
Local/Remote State	LRS=	1 byte	Command or Query. Sets or returns the Local or Remote state for the Indoor SSPA in the form x, where: 0 = Local 1=Serial 2=Ethernet 3=Serial+Ethernet Default Value: 3 (Serial+Ethernet) Example: <1/LRS=3'cr' >0001/LRS='cr''lf' Notes: 1) Use this command to limit changes from being made on multiple interfaces at the same time. 2) State is always in remote mode for Outdoor SSPAs such as the LPOD-R. 3) The LRS command is available in all modes as a means of acquiring control. You will always have query access in any mode. 4) The LPOD-R treats LRS=0 as reserved, and refuses the command by returning a mode error. 5) The Web server interface is inoperable unless LRS is set to enable Ethernet remote control.	LRS= LRS?	LRS?	LRS=x (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Unit MAC Address	N/A	17 bytes	Query only. Returns the MAC address of the unit, reported in hexadecimal format. Example: <1/MAC?'cr' >0001/MAC=00-06-B0-00-D2-A7'cr''lf'	MAC=	N/A	MAC=xx-xx-xx-xx-xx-xx (See Description of Arguments for details)
Unit Alarm Mask	MSK=	5 bytes	Command or Query. Sets or returns alarm mask conditions. in the form abcde, where: 0 = Fault, 1 = Alarm 2 = Masked a = Low Forward RF Power b = External Reference Lock detect c = Fan Speed d = LNB Current Detect e = LNB 22V Power Supply Default Value: 22111 Example: <1/MSK=22111'cr' >0001/MSK=1'cr''lf' Notes: 1) If the mask value for a certain parameter is set to fault then a fault condition will be registered if specified hardware conditions are not met. 2) If the mask value is set to alarm then a fault condition will only appear to be an alarm that will not trigger a switchover in a redundant system. 3) If the mask value is set to masked then the fault will never be reported to the user	MSK= MSK? MSK*	MSK?	MSK=abcde (See Description of Arguments for details)
Mute State	MUT=	1 byte	Command or Query. Mute the unit in the form x, where: 0 = Disable (Not Muted) 1 = Enable (Muted) 2 = Unit muted due to AUX mute signal (Query response only – see Note) Default Value: 1 Example: <1/MUT=1'cr' >0001/MUT=1'cr''lf' Note: The value 2 displays only in response to a query and cannot be issued as a command. When MUT=2 this indicates that an unexpected "hardware" mute condition is present. For example, an auxiliary mute could be present if the auxiliary mute has been enabled and the signal to unmute the unit is not provided. Additionally, certain faults can generate a hardware mute such as the BUC lock detect, the LNB current draw (if enabled by the user), or the LNB voltage (if enabled by the user). If MUT=2, check the active faults and the status of the auxiliary mute.	MUT= MUT? MUT*	MUT?	MUT=x (Same format as command arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Number of Unread stored Events	N/A	3 bytes	Query only. Returns the number of stored events that remain unread, in the form xxx. Example: <1/NUE?'cr' >0001/NUE=126'cr''lf'	NUE=	NUE?	NUE=xxx
Number of Unread stored Statistics	N/A	3 bytes	Query only. Returns the number of stored statistics that remain unread, in the form xxx. Example: <1/NUS?'cr' >0001/NUS=126'cr''lf'	NUS=	NUS?	NUS=xxx
Part Number	N/A	96 bytes alphanumeric	Query Only Returns the DOTCODE string that was loaded into the unit. Example: <1/PNM? 'cr' >0001/PNM=HPODC0.350WRSW00'cr''lf'	PNM= PNM? PNM *	PNM?	PNM=x….x (See Description of Arguments for details)
Retrieve Alarm Status	N/A	168 bytes	Query only. Returns the Alarm status of the unit, where: OK = no fault condition FT = faulted AL = alarm YS = Yes NO = No MS = masked NA = unused Example: <1/RAS?'cr' >0001/RAS='cr' LINEV=OK'cr' input LINE voltage LINEA=OK'cr' input LINE amperage LNBVT=NA'cr' +13/18V LNB power supply P13VT=NA'cr' +13.5V power supply P10V1=NA'cr' +10V power supply A10V1=NA'cr' +10V1 RF supply A10V2=NA'cr' +10V2 RF supply P7V8T=NA'cr' +7.8V power supply P5V8T=OK'cr' +5.8V power supply P2V5T=NA'cr' +2.5V power supply P1V2T=OK'cr' +1.2V power supply N5V8T=AL'cr' -5.8V power supply FANV=OK'cr' Fan voltage FANA=OK'cr' Fan current ATEMP=OK'cr' Amplifier temperature	RAS=	RAS?	RAS=x….x (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Alarm Status (cont)			SHTDN=OK'cr' Over-temp shutdown IICST=OK'cr' I2C bus status FWPWR=MS'cr' Forward power in dBm CHKSM=OK'cr' Flash checksum FPGAD=NA'cr' FPGA done status BUCLD=OK'cr' BUC lock detect REFLD=NA'cr' Reference lock detect LNBCS=NA'cr' LNB current status SWITC=NA'cr' Waveguide switch position status RDLNK=NA'cr' Redundant link status TRMST=YS'cr' Terminal Status UNAFW=OK'cr''lf' Unaccepted Firmware Note: Field values display when the appropriate model/options are selected/installed. Otherwise, unused fields display NA.			
Reboot	RBT=	1 byte	Command only. Performs a Soft Reboot of the unit, where: 1 = Reboot System Example: <1/RBT='cr'	RBT= RBT? RBT*	N/A	RBT=x (See Description of Arguments for details)
Retrieve Configuration Status	N/A	45 bytes	Query only. Returns the configuration status of the unit, where: ATT= attenuation, in dB AMP= RF power amplifier state: 0=OFF 1=ON MUT=RF mute state: 0=unmuted 1=muted RED=Online status for redundancy ESW=Redundancy state and mode state: 0=OFF 1=ON Tx only 2=ON Tx & Rx AOF=Attenuator Offset, in dB AFR= auto fault recovery 0 = manual 1 = auto XRF = External reference status: N/A = no external reference 05M = 5 MHz 10M = 10 MHz	RCS=	RCS?	RCS=x….x (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Configuration Status (cont)			Example: <1/RCS?'cr' >0001/RCS='cr' ATT=12.75'cr' AMP=1'cr' MUT=1'cr' ONL=1'cr' ESW=1'cr' AOF=00.00'cr' AFR=1'cr' XRF=N/A'cr''lf' (see Note 2) Notes: 1) Unused fields shall be padded with X's. 2) XRF is always N/A when the internal reference oscillator option is not installed.			
Retrieve Equipment Type [E]	N/A	22 bytes	Query only. Returns a string indicating the Model Number and the version of the installed M&C firmware. Example: <1/RET?'cr' >0001/RET=LPOD-R VER: 1.1.1'cr''lf'	RET=	RET?	RET=x….x (See Description of Arguments for details)
Retrieve Maintenance Status	N/A	213 bytes alphanumeric	Query only. Returns the maintenance status of the unit, where: LINEV = LINE voltage LINEA = LINE amperage LNBVT = +13/18V LNB power supply (see Note) P13VT = +13.5V power supply P10V1 = +10V1 power supply A10V1 = 10V1 on RF Module A10V2 = 10V2 on RF Module (see Note) P7V8T = +7.8V power supply P5V8T = +5.8V power supply P2V5T = +2.5V power supply P1V2T = +1.2V power supply N5V8T = -5.8V power supply FAN1V = Fan 1 voltage FAN1A = Fan 1 current BUCVT = BUC tuning voltage (see Note) FWPWR = Forward power in dBm REFVT = Reference osc. tuning voltage (see Note) LNBCS = LNB current supply in mA (see Note) ATEMP = Heatsink temperature in Celsius OTEMP = Outdoor temperature in Celsius (see Note)	RMS=	RMS?	RMS=x….x (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Maintenance Status (cont)	N/A	213 bytes alphanumeric	Example: <1/RMS?'cr' >0001/RMS= LINEV=046.9 LINEA=000.3 LNBVT=XXXXX P13VT=XXXXX P10V1=010.5 A10V1=XXXXX A10V2=XXXXX P7V8T=XXXXX P5V8T=006.1 P2V5T=XXXXX P1V2T=001.3 N5V8T=-03.6 FAN1V=010.3 FAN1A=011.6 BUCVT=XXXXX FWPWR=<24.0 REFVT=XXXXX LNBCS=XXXXX ATEMP=028.0 OTEMP=011.0 Note: LNBVT, FANR2, A10V2, BUCVT, REFVT, LNBCS, and OTEMP display when the appropriate options are installed; Otherwise, the value fields shall be padded with X's			
Retrieve Next 5 unread stored Events	N/A	75 bytes	Query only. Unit returns the oldest 5 Stored Events that have not yet been read over the remote control. Reply format: {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR} Sub-body{CR}Sub-body, where Sub-body= ABCCddmmyyhhmmss: A = Fault/clear indicator: F=Fault C=Clear I=Info B = Fault type: 1=Unit 2=RF 3=Log CC = Fault Code numbers (as in RAS?) or Info Code: 0=Power Off 1=Power On 2=Log Cleared 3=Global Config Change 4=Redundancy Config Change	RNE=	RNE?	RNE={CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Next 5 unread stored Events (cont)	N/A	75 bytes	RAS fault codes map is as follows: 1) LINEV 2) LINEA 3) LNBVT 4) P13VT 5) A10V1 6) A10V2 7) 10VPS 8) P5V8T 9) P2V5T 10) P1V2T 11) N5V8T 12) P7V8T 13) FAN1V 14) FAN1A 15) ATEMP 16) SHTDN 17) IICST 18) FWPWR 19) CHKSM 20) FPGAD 21) BUCLD 22) REFLD 23) LNBCS 24) SWITC Notes: 1) If there are less than 5 events to be retrieved, the remaining positions are padded with zeros. 2) If there are no new events, the response is RNE*. 3) A Global Config Change is defined as any time a command is successfully executed. 4) A query does not set the status change flag. 5) The status change flag is cleared after being read. No other events toggle a status change.			
Retrieve Next 5 unread stored Statistics	N/A	75 bytes	Query only. Returns the oldest five stored statistics entries that have not yet been read, in the form: {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where: Sub-body= ddmmyyhhmmssaaa.abbb.bccc.cdd.ddefghhh.hiii.i, where: ddmmyy = day/month/year hhmmss = hour:minute:second aaa.a = Operating Temperature (I.E. +40.0) bbb.b = Amp Temperature (I.E. +40.0) ccc.c = RF Power output dd.dd = Attenuation Setting e = Amp On/Off f = Mute On/Off g = Online/Offline Status hhh.h = LNB Current (mA) iii.i = BUC Tuning Voltage Notes: 1) If there are less than five entries to be retrieved, the remaining positions are padded with zeros. 2) If there are no new entries, the response is RNS*.	RNS=	RNS?	RNS={CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Serial Number [E]	N/A	9 bytes	Query only. Returns the unit's 9 digit serial number in the form xxxxxxxxx. Example: <1/RSN?'cr' >0001/RSN=072282040'cr''lf'	RSN=	RSN?	RSN=xxxxxxxxx (See Description of Arguments for details)
Retrieve Utility Status	N/A	15 bytes	Query only. Returns the utility status of the unit, response is comma delimited. Exists only for backward compatibility. Example: <1/RUS?'cr' >0001/RUS='cr''lf' ADR=XXXX BDR=XXXXX REF=XXX'cr''lf'	RUS=	RUS?	RUS=x….x (See Description of Arguments for details)
Set FSK Address	SFA=	2 bytes, numeric	Command or Query. Sets or returns the FSK Address in the form xx, where: xx = 01 to 15 Default Value: 01 Example: <1/SFA=01'cr' >0001/SFA='cr''lf'	SFA= SFA? SFA*	SFA?	SFA=xx (See Description of Arguments for details)
Serial Number	N/A	9 bytes	Query only. Returns the unit's nine-digit serial number in the form xxxxxxxxx. Example: <1/SNO?'cr' >0001/SNO=072282040'cr''lf' Note: This query is functionally identical to RSN.	SNO=	SNO?	SNO=xxxxxxxxx (See Description of Arguments for details)
Set Statistics Interval	SSI=	2 bytes	Command or Query. Sets or returns the interval at which statistics are logged in minutes, in the form xx, where: xx =. 01 (min) to 99 (max) Default Value: 90 Example: <1/SSI=90'cr' >0001/SSI='cr''lf'	SSI= SSI?	SSI?	SSI=xx (Same format as command arguments)
Software Revision	N/A	34-37 bytes	Query only. Returns the firmwares installed in the Active and Pending images: Example: <1/SWR?'cr' >0001/SWR=FW-0020765;1.1.1mx;03/19/14 PendingImage INVALID	SWR=	SWR?	SWR=x.y.zz x.y.zz (See Description of Arguments for details)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are printable ASCII characters)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Set RTC Time	TIM=	6 bytes	Command or Query. Sets or returns the time, from midnight, in the form hhmmss, where: hh = hours, from 00 to 23 mm = minutes, from 00 to 59 ss = seconds, from 00 to 59 Examples: (time = 23 hours, 12 minutes and 59 seconds since midnight – i.e., 11:12:59 PM): Command Example: <1/TIM=231259'cr' >0001/TIM='cr''lf' Query Example: <1/TIM?'cr' >0001/TIM=231259'cr''lf'	TIM= TIM? TIM *	TIM?	TIM=xxxxxx (Same format as command arguments)
Temperature	N/A	5 bytes	Query only. Returns the temperatures of the Heatsink in the form sxxx, where: s = sign byte (plus + or – minus) xxxx = the temperature. Example: <1/TMP?'cr' >0001/ TMP=+26.0'cr''lf'	TMP=	TMP?	TMP=sxx xx (See Description of Arguments for details)
Terminal Status Change	N/A	1 byte	Query only. Returns the change in configuration since the last time the query was issues in the form x, where: x = 0 (no status change) or 1 (a status change has occurred) Example: <1/TSC?'cr' >0001/TSC=0'cr''lf' Notes: 1) A status change is defined as any time a parameter is changed, e.g., when a command that changes a value is successfully executed. A status change also results when there is a redundant switchover, or a fault condition. 2) A query does not set the status change flag. 3) The status change flag clears after being read.	TSC=	TSC?	TSC=x (See Description of Arguments for details)

Appendix A. CABLE DRAWINGS

A.1 Overview

This appendix provides line details for the cables available for use with the LPOD-R in Standalone applications. Each figure illustrates the cables technical specifications – e.g., connector types used, cable labeling, wiring lists, etc.

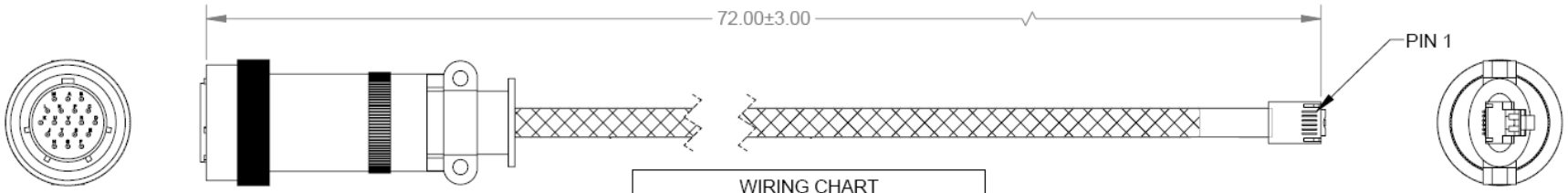
A.2 Control and Data Cables

Figure	CEFD CABLE P/N	DESCRIPTION	USED FOR:
A-1	CA-0020526	Serial Interface Cable (19-pin circular connector to RJ-11)	Connecting standalone LPOD-R PS 1 or PS 1.5 J6 | COM1 19-pin receptacle to CLC-10 RJ-11 comms jack (Cable and CLC-10 are furnished as part of optional CEFD KIT KT-0020518)
A-2	CA-0000352	Ethernet Interface Cable (19-pin circular connector to <2X> RJ-45)	Connecting standalone LPOD-R PS 1 or PS 1.5 J6 | COM1 19-pin receptacle to LPOD*net* or user PC Ethernet jack *(Cable and LPOD*net *are furnished as part of optional CEFD KIT KT-0000203)*
A-3	PP/CAT5FF7FTGY	CAT5 Ethernet Cable (RJ-45 to RJ-45)	Connecting standalone LPOD-R PS .5 J6 | COM1 RJ-45 receptacle to LPOD*net* or user PC Ethernet jack (LPODnet is furnished as part of optional CEFD KIT KT-0000203)

A.2.1 Serial Interface Cable

The Comtech EF Data CLC-10 Serial M&C Accessory Kit (CEFD P/N KT-0020518) includes the CA-0020526 Serial Interface Cable. This kit is optionally available to provide optional serial-based monitor and control of standalone LPOD-R applications using the CLC-10 Comtech LPOD Controller (a preconfigured Two Technologies, Inc. TechTerm Handheld Terminal).

The circular connector installs onto the J6 | COM 1 connector on a standalone LPOD-R PS 1 or PS 1.5. The RJ-11 connector plugs directly into the CLC-10.



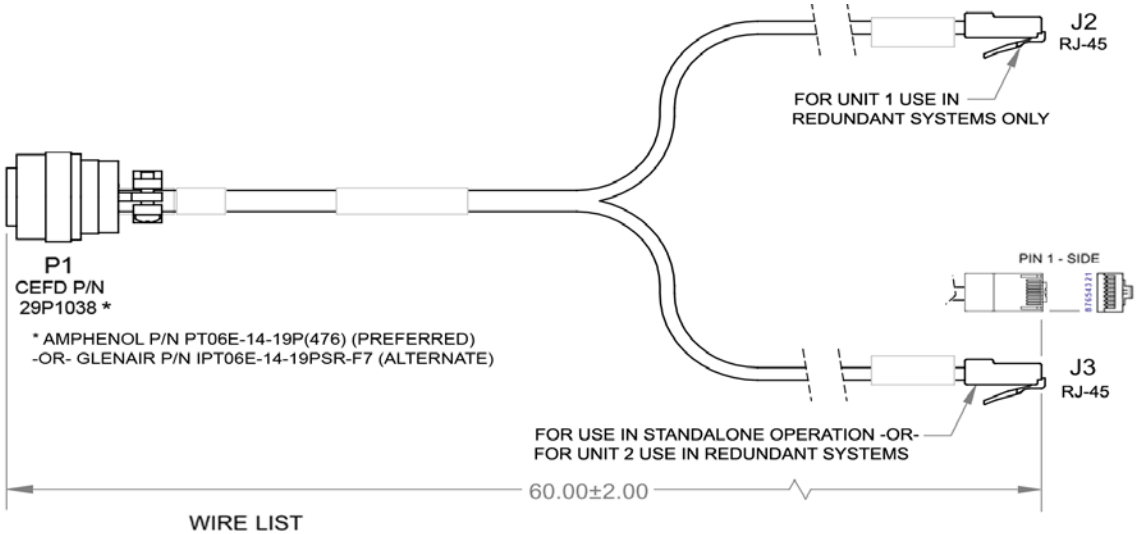
WIRING CHART	
FROM CIRCULAR CONN	TO RJ-11 CONN
R	1
C	2
A	3
D	4
B	5
K	6

Figure A-1. Serial Interface Cable (CEFD P/N CA-0020526, part of KT-0020518)

A.2.2 Ethernet Interface Cable

The Comtech EF Data Ethernet Utility Kit (CEFD P/N KT-0000203) includes the CA-0000352 Ethernet Interface Cable. This kit is optionally available to provide Ethernet-based M&C of standalone LPOD-R applications using a Samsung NB30 Plus Netbook (LPOD*net*).

The P1 circular connector installs onto the J6 | COM 1 connector on a standalone LPOD-R PS 1 or PS 1.5. Use the J3 RJ-45 connector to connect directly to either the LPOD*net*'s Ethernet network jack or a user PC. The J2 RJ-45 connector is not used in standalone applications.



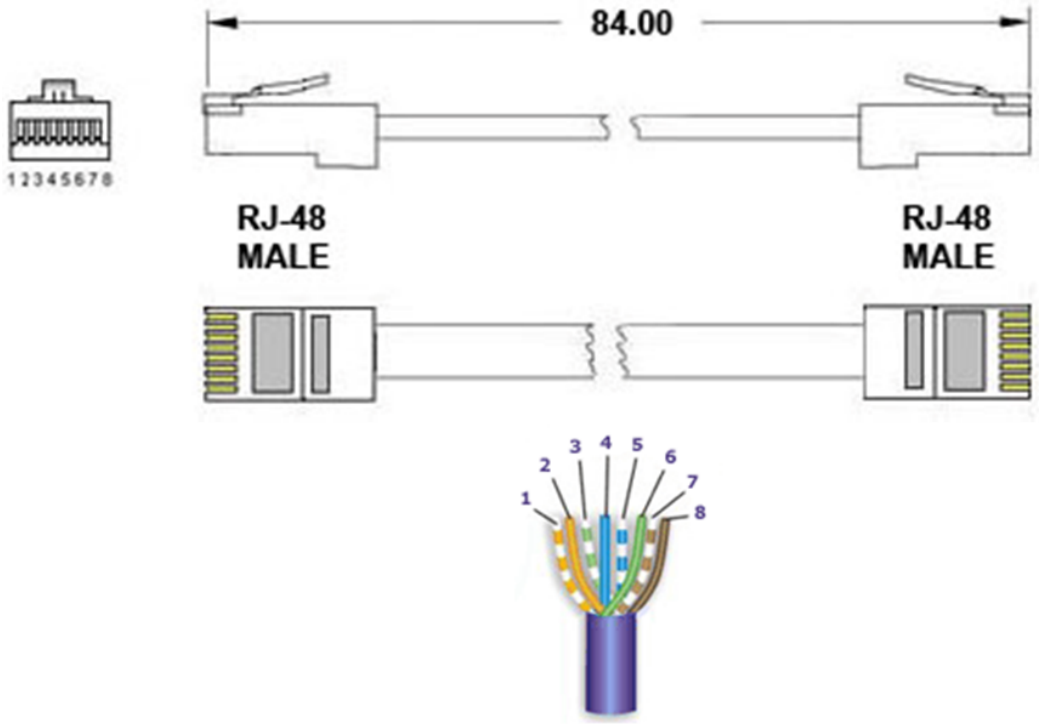
WIRE LIST

FROM P1	TO	RJ-45 (COLOR)	SIGNAL
P1 - E	J2 - 1	WHT/ORN	Tx +
P1 - G	J2 - 2	ORN	Tx -
P1 - P	J2 - 3	WHT/GRN	Rx +
P1 - J	J2 - 6	GRN	Rx -
P1 - F	J3 - 1	WHT/ORN	Tx +
P1 - H	J3 - 2	ORN	Tx -
P1 - V	J3 - 3	WHT/GRN	Rx +
P1 - U	J3 - 6	GRN	Rx -

Figure A-2. Ethernet Interface Cable (CEFD P/N CA-0000352, part of KT-0000203)

A.2.3 Ethernet Data Cable (CAT5 RJ-45)

This CAT5 RJ-45 cable is available for directly connecting the LPOD-R PS .5 J6 | COM1 Ethernet receptacle to the Ethernet network jack of the LPOD*net* or a user PC.



T568B Wiring Diagram		
Pair No.	**Wire**	**Pin No.**
1	Blue/White tracer	5
	Blue	4
2	Orange/White tracer	1
	Orange	2
3	Green/White tracer	3
	Green	6
4	Brown/White tracer	7
	Brown	8

350 MHz Category 5E Patch Cable Specs:

- EIA/TIA TSB-40A ETL Verified
- Contact Gold Plating 50µ" (Short body)
- Assembly Strain Relief
- Stranded 50dB
- RoHS Compliant
- Length: 7 ft.

Figure A-3. Ethernet Data Cable (CEFD P/N PP/CAT5FF7FTGY)

A.3 RF Cables

Figure	CEFD CABLE P/N	DESCRIPTION	USED FOR:
A-4	CA/3722-X	Type N to Type N 1/4" Heliax Coaxial Cable (lengths vary)	LPOD-R Rx or Tx connections in standalone LPOD-R applications

A.3.1 RF Cable (Type N)

Use this Type N cable for the Rx or Tx connections in LPOD-R Standalone or future 1:1 Redundancy applications:

For LPOD-R PS 1 C-Band and X-Band Standalone applications, the cable connects the units J2 | RF OUT port directly to your Rx signal destination.

For all LPOD-R applications – For Standalone use, the cable connects directly from these LPOD interfaces to your Rx signal destination or Tx signal source. For future 1:1 Redundancy applications, use the cable to connect the J1 | LBAND IN or J10 | MODEM Rx ports to the systems respective signal splitters.

PART NO.	DIM A
CA/3722	144.00 ± 4.00
CA/3722-1	48.00 ± 1.50
CA/3722-2	60.00 ± 2.00
CA/3722-3	90.00 ± 2.00
CA/3722-4	264.00 ± 4.00
CA/3722-5	288.00 ± 4.00
CA/3722-6	72.00 ± 2.00
CA/3722-7	240.00 ± 4.00
CA/3722-8	120.00 ± 4.00
CA/3722-9	180.00 ± 4.00
CA/3722-10	192.00 ± 12.00
CA/3722-11	108.00 ± 4.00

NOTE: CABLE MUST MEET VSWR 10.96-12.75 ≤ 1.40:1
WITH INSERTION LOSS AS FOLLOWS:

FREQUENCY MHz	ATTENUATION db/100ft	ATTENUATION db/100 M	AVERAGE POWER kW
10000	21.8	71.5	0.054
12000	24.3	79.7	0.049
14000	26.7	86.3	0.044
16000	29.0	95.2	0.040

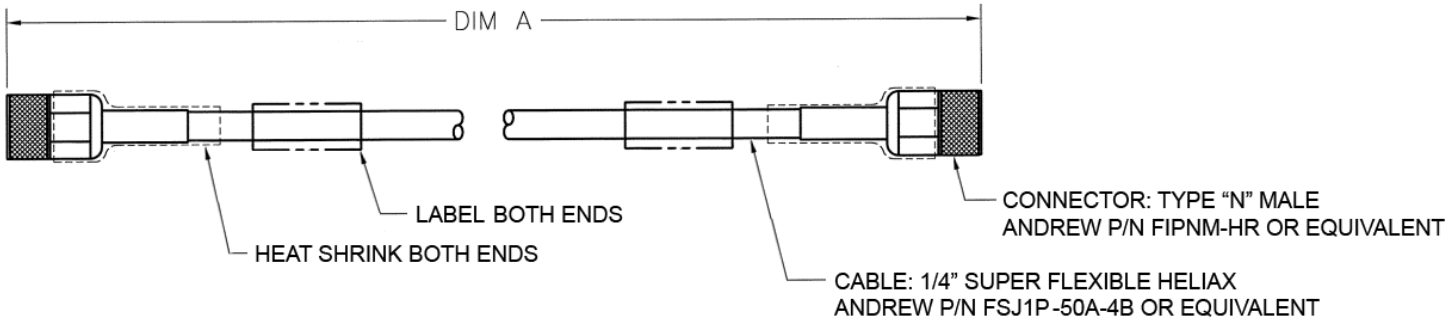

DIM A
LABEL BOTH ENDS
HEAT SHRINK BOTH ENDS
CONNECTOR: TYPE "N" MALE
ANDREW P/N FIPNM-HR OR EQUIVALENT
CABLE: 1/4" SUPER FLEXIBLE HELIAX
ANDREW P/N FSJ1P-50A-4B OR EQUIVALENT

Figure A-4. 1/4" Heliax Coaxial Cable (CA/3722-X)

Appendix B. MAINTENANCE

B.1 Introduction

This appendix outlines the procedures for uninstalling the LPOD-R PS .5, PS 1, or PS 1.5 fan shroud, inspecting and cleaning the heat sinks, and then re-installing the fan shroud.

LPOD-R PS .5 **LPOD-R PS 1** **LPOD-R PS 1.5**

Figure B-1. Comtech EF Data LPOD-R Outdoor Amplifiers / BUCs

The fans used by Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) (Figure B-1) are designed for long life, even in harsh environments. Still, they are mechanical devices, subject to wear, and may need replacement after several years.

In most environments, Comtech EF Data recommends clearing the heat sinks of dust and debris approximately once per year to ensure optimal fan life.

B.2 Cleaning the LPOD-R PS .5 Heat Sinks

Do these steps to clean the LPOD-R PS .5 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the four fan cover screws – see Figure B-2. Be sure to use an appropriate screwdriver, such as the one provided with the LPOD-R, to avoid damaging the screws.
3	Set aside the cover plate to access the fan assembly – see Figure B-3.
4	**CAUTION – Carefully set aside the fan assembly. Be sure not to crimp or otherwise damage the fan's power supply wiring – see Figure B-4.**
5	Visually inspect the exposed LPOD-R heat sinks for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sinks as needed – see Figure B-5. Be sure to blow between the heat sink fins to remove any foreign object accumulation.
6	**CAUTION – Reseat the fan assembly in the LPOD-R chassis. Be sure to keep the fan power supply wiring clear of the fan and heat sink surfaces. See Figure B-6.**
7	Re-install the fan cover plate onto the chassis – see Figure B-7 – be sure to keep the fan power supply wiring clear of the cover plate surfaces. Then, re-install the four cover screws as described in Step 2. Torque the screws to 11 ±2 inch lbs.
8	Reconnect the power source to the LPOD-R.

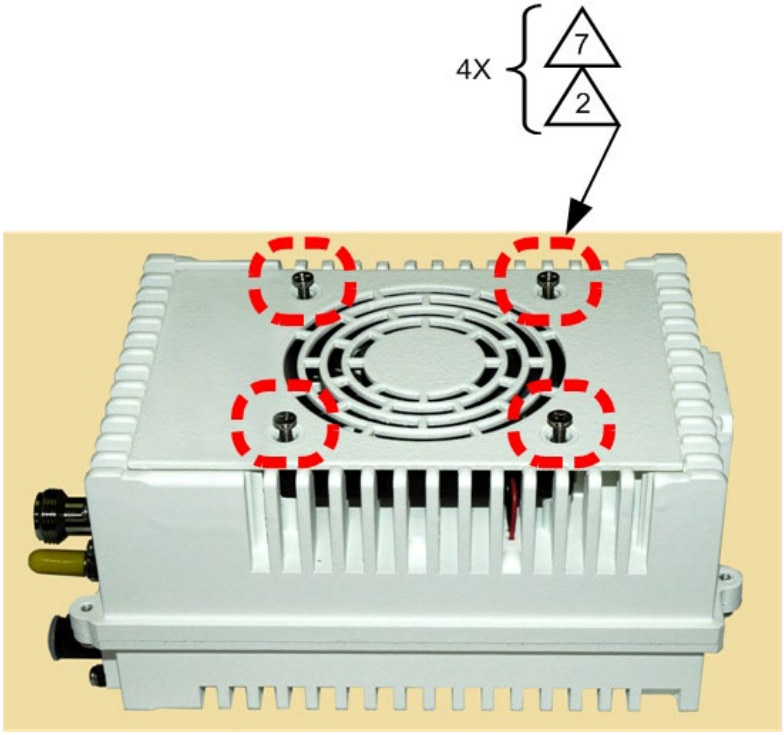


Figure B-2. LPOD-R PS .5 Cover Plate Screw Locations

Figure B-3. Remove the Cover Plate

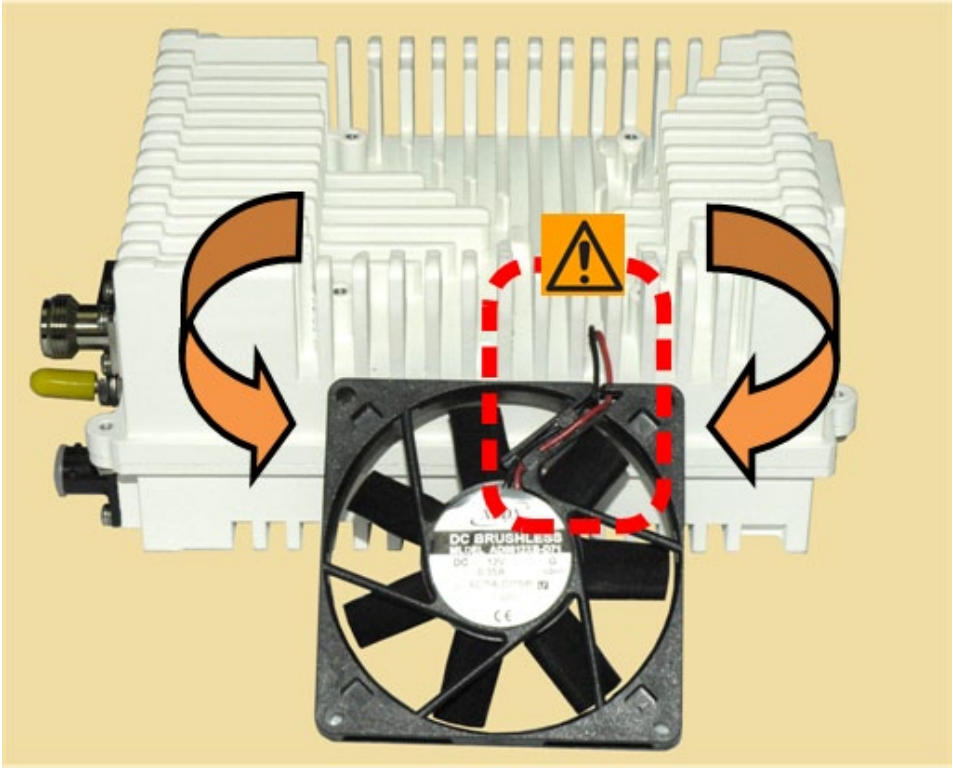


Figure B-4. Set Aside the Fan Assembly

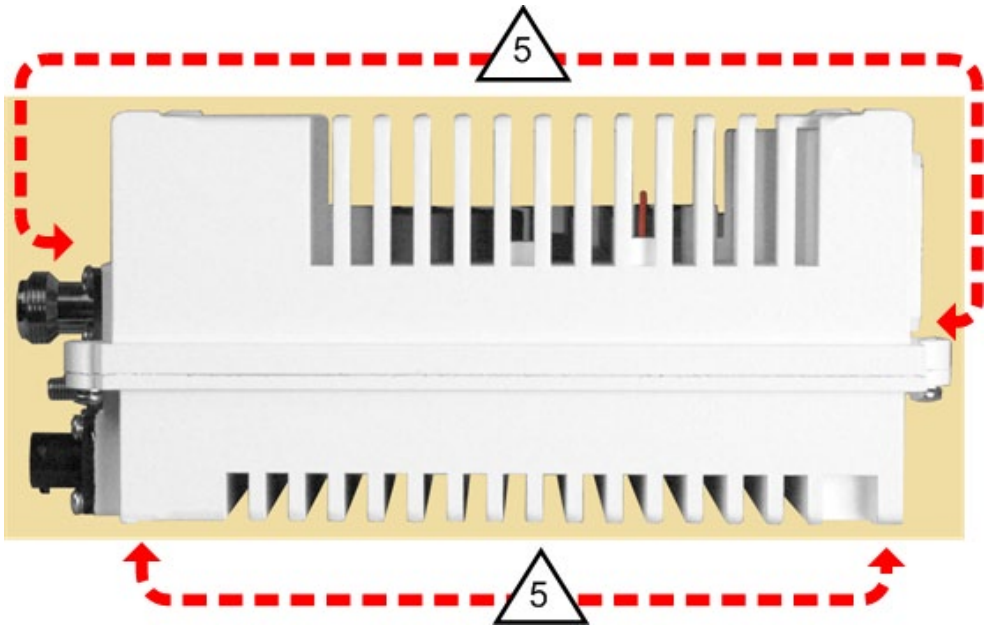


Figure B-5. LPOD-R PS .5 Heat Sink Locations (Fan Not Shown for Clarity)

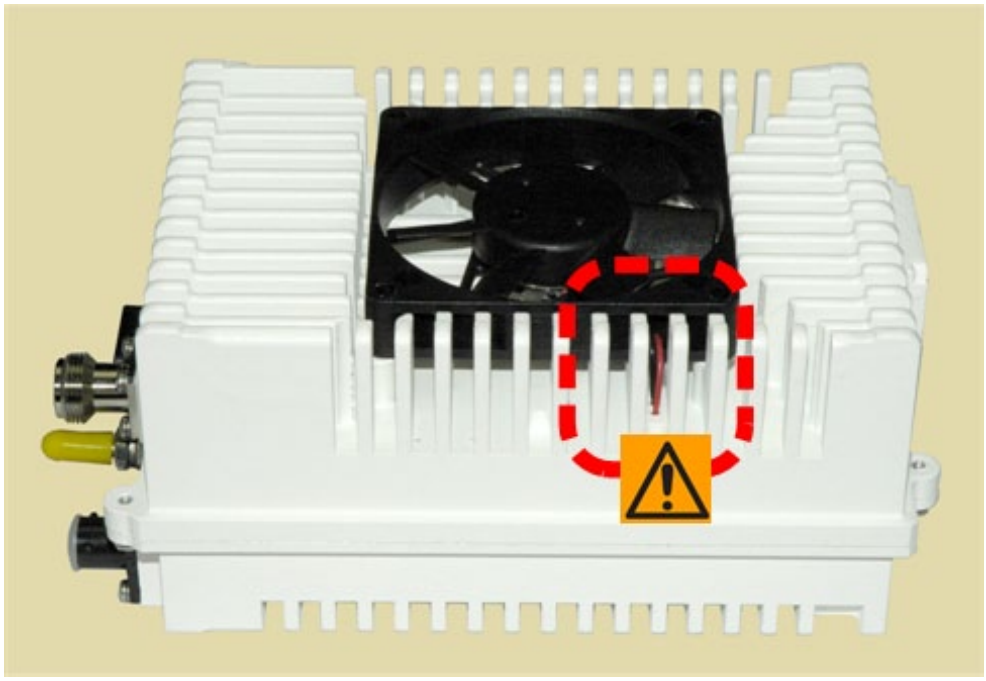


Figure B-6. Reseat the Fan Assembly

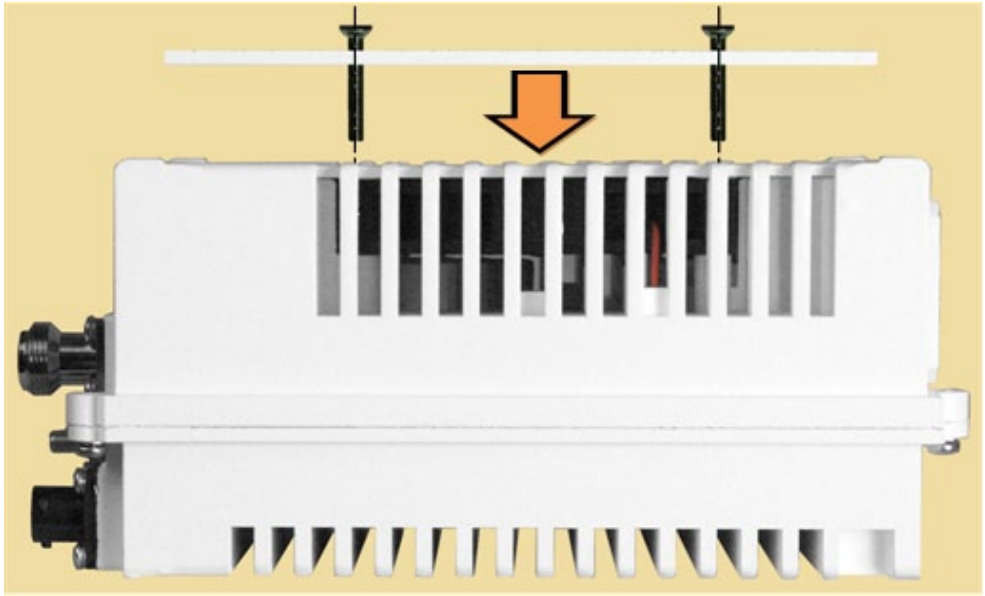


Figure B-7. Replace the Cover Plate

B.3 Cleaning the LPOD-R PS 1 Heat Sinks (FUTURE)

Do these steps to clean the LPOD-R PS 1 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the eight screws – four on either side of the fan shroud – see Figure B-8.
	Be sure to use an appropriate screwdriver, such as the one provided with the LPOD-R, to avoid damaging the screws.
3	Lift the fan shroud assembly far enough off the chassis to expose the heat sinks and access the fan's power supply connection – see Figure B-9.
4	Disconnect the fan power supply. First, depress the connector's locking mechanism, and then pull apart the mated components – see Figure B-10.
5	Visually inspect the exposed LPOD-R heat sinks, located on the top and either side of the chassis, for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sinks as needed – see Figure B-11.
	Be sure to blow between the heat sink fins to remove any foreign object accumulation.
6	Reconnect the fan power supply by pressing the male and female connectors together until the locking mechanism snaps and locks – see Figure B-12.
7	Re-install the fan shroud onto the chassis – be sure to keep the fan power supply cable clear of the fan and heat sink surfaces. Then, re-install the eight screws as described in Step 2.
	Torque the screws to 11 ±2 inch lbs.
8	Reconnect the power source to the LPOD-R.

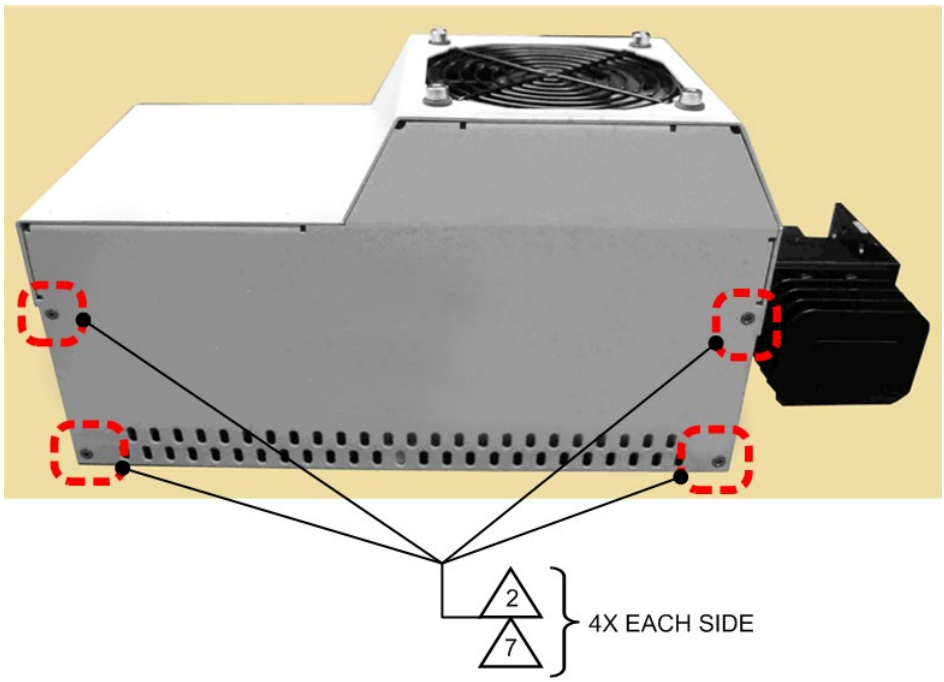


Figure B-8. LPOD-R PS 1 Shroud Screw Locations

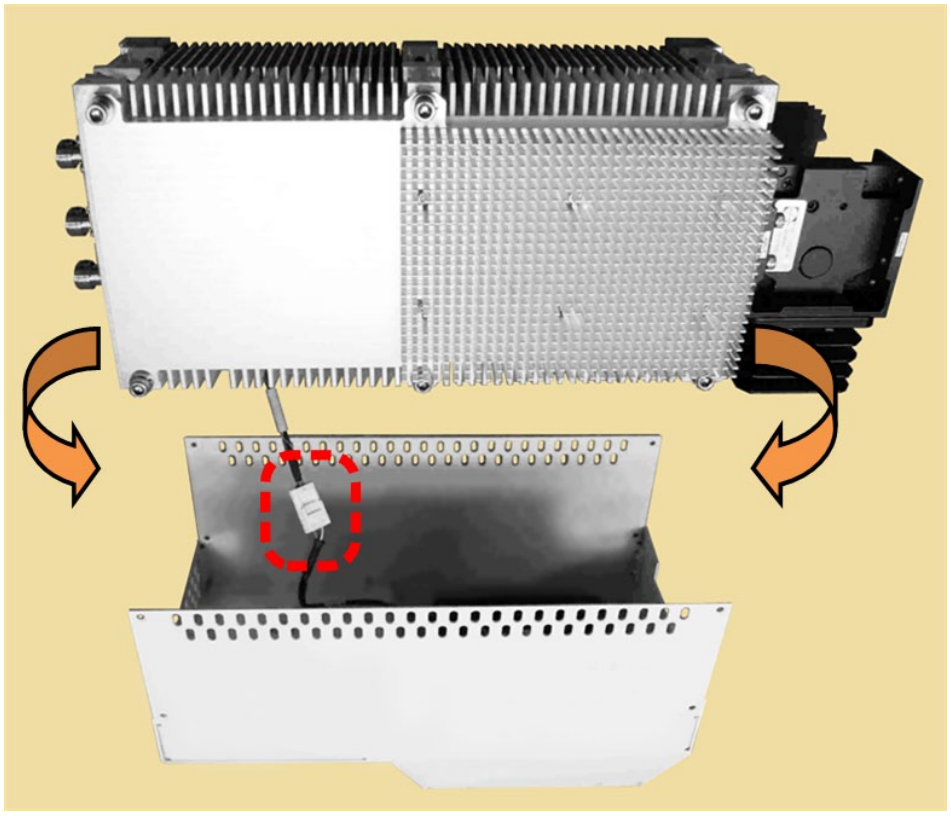


Figure B-9. Remove the Fan Shroud

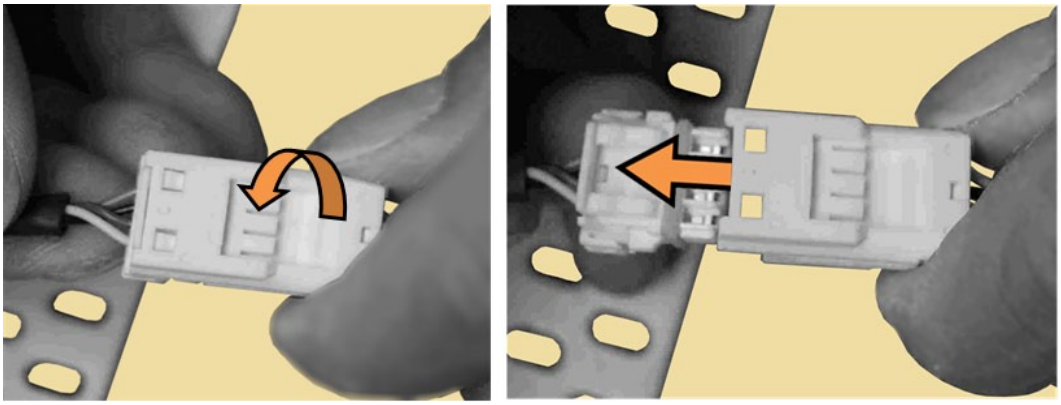


Figure B-10. Disconnect the Fan Power Supply

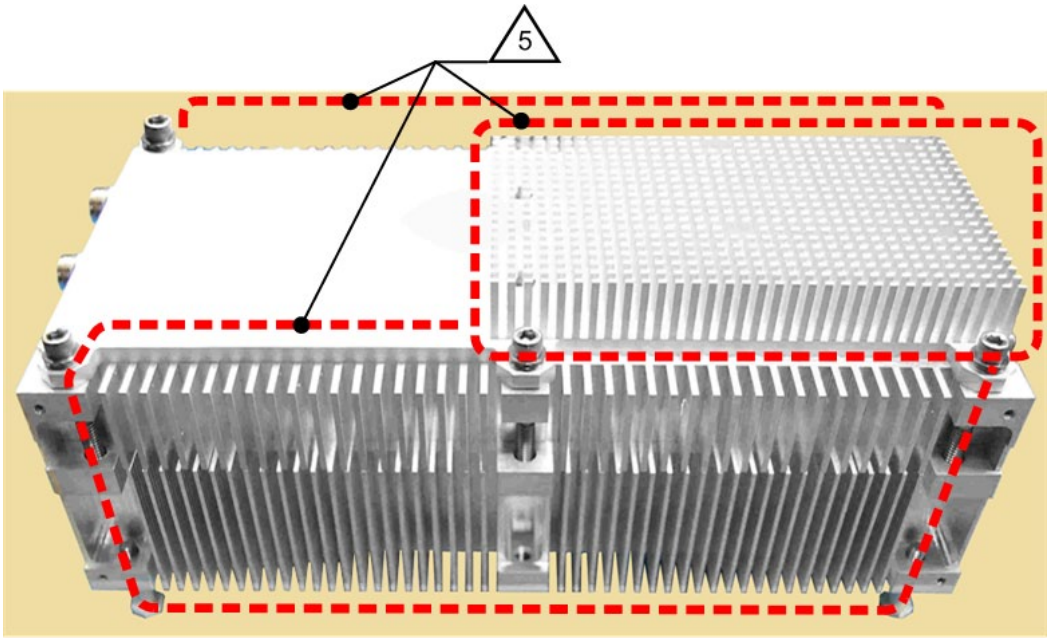


Figure B-11. LPOD-R PS 1 Heat Sink Locations

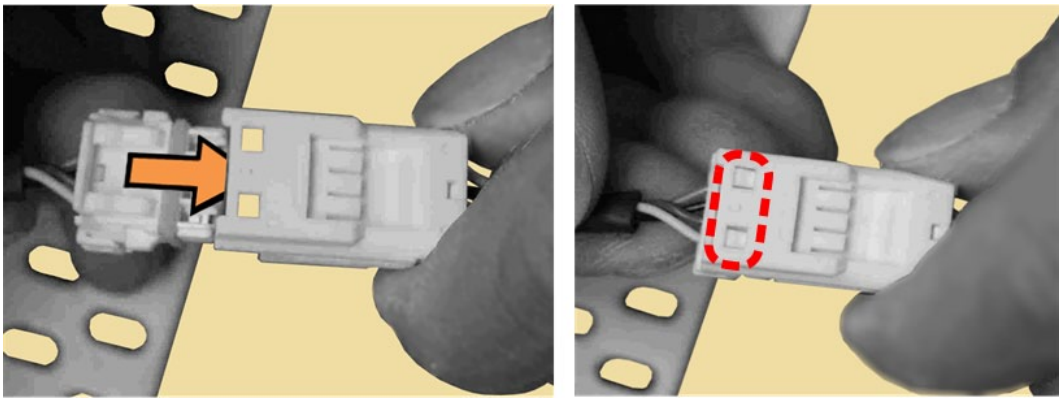


Figure B-12. Reconnect the Fan Power Supply

B.4 Cleaning the LPOD-R PS 1.5 Heat Sinks (FUTURE)

Follow these steps to clean the LPOD-R PS 1.5 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the screws from all four sides of the LPOD-R as needed – see Figure B-13. Be sure to use an appropriate screwdriver, such as the one provided with the LPOD-R, to avoid damaging the screws. The length of the four screws indicated in green are longer than those indicated elsewhere. Be sure to re-install these longer screws at the same locations. The two screws located behind the waveguide may be difficult to remove without first removing the waveguide from the chassis.
3	Lift the fan shroud assembly far enough off the chassis to expose the heat sink and access the fan power supply connections – see Figure B-14.
4	Disconnect each fan power supply by carefully pulling the mated connector components straight apart – see Figure B-15. Do not twist the mated cable connection when disconnecting the cable assemblies.
5	Visually inspect the exposed LPOD-R heat sink, located on the top of the chassis, for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sink as needed – see Figure B-16. Be sure to blow between the heat sink fins to remove any foreign object accumulation.
6	Reconnect each fan power supply. First, align the male and female connector's tabs. Then, push the connectors together until the connection locks – see Figure B-17 Do not twist the mated cable connections when reconnecting the fan power supplies. The fan power supply cables are labeled Fan 1 and Fan 2. Make sure to connect the chassis Fan 1 cable to the fan shroud Fan 1 cable, and the chassis Fan 2 cable to the fan shroud Fan 2 cable.
7	Re-install the fan shroud onto the chassis – Be sure to keep the fan power supply cables clear of the fan and heat sink surfaces. Then, re-install all screws as described in Step 2, making sure to re-install the four longer screws at their same locations. Torque the screws to 8 ±1 inch lbs.
8	Reconnect the power source to the LPOD-R.

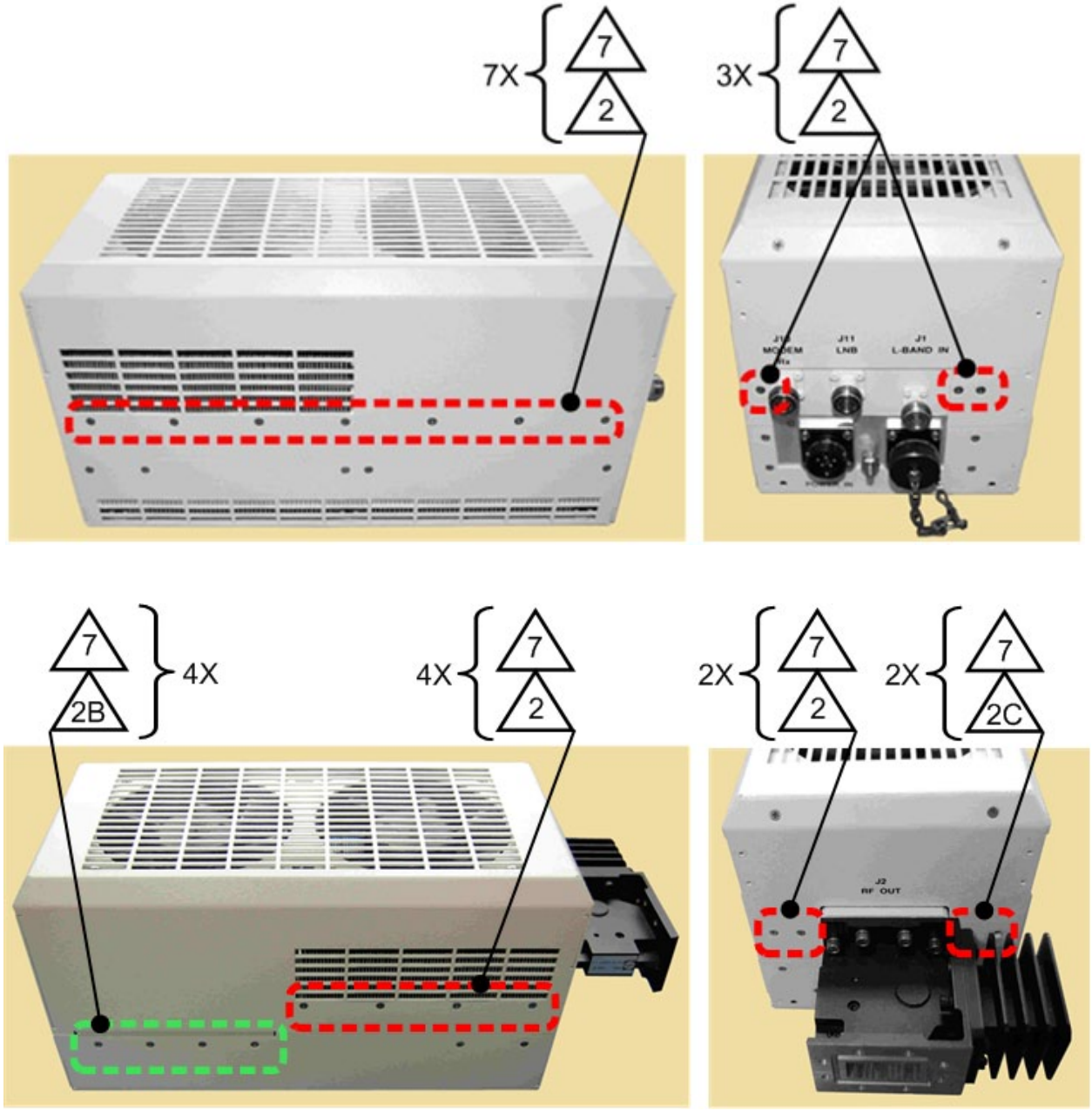


Figure B-13. LPOD-R PS 1.5 Shroud Screw Locations

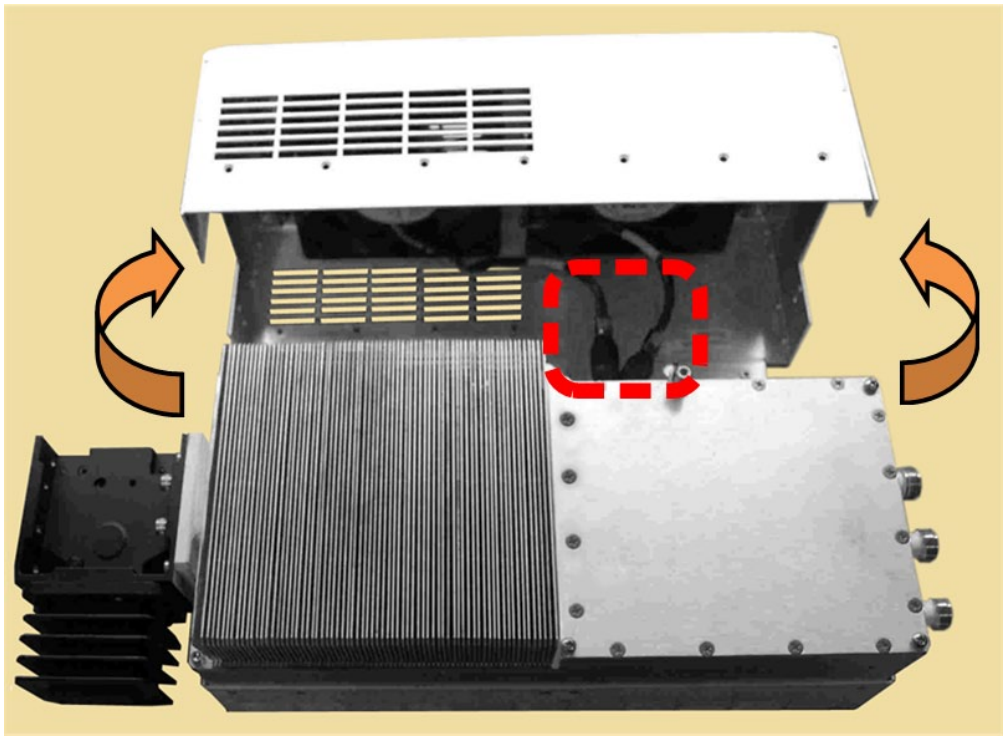


Figure B-14. Remove the Fan Shroud

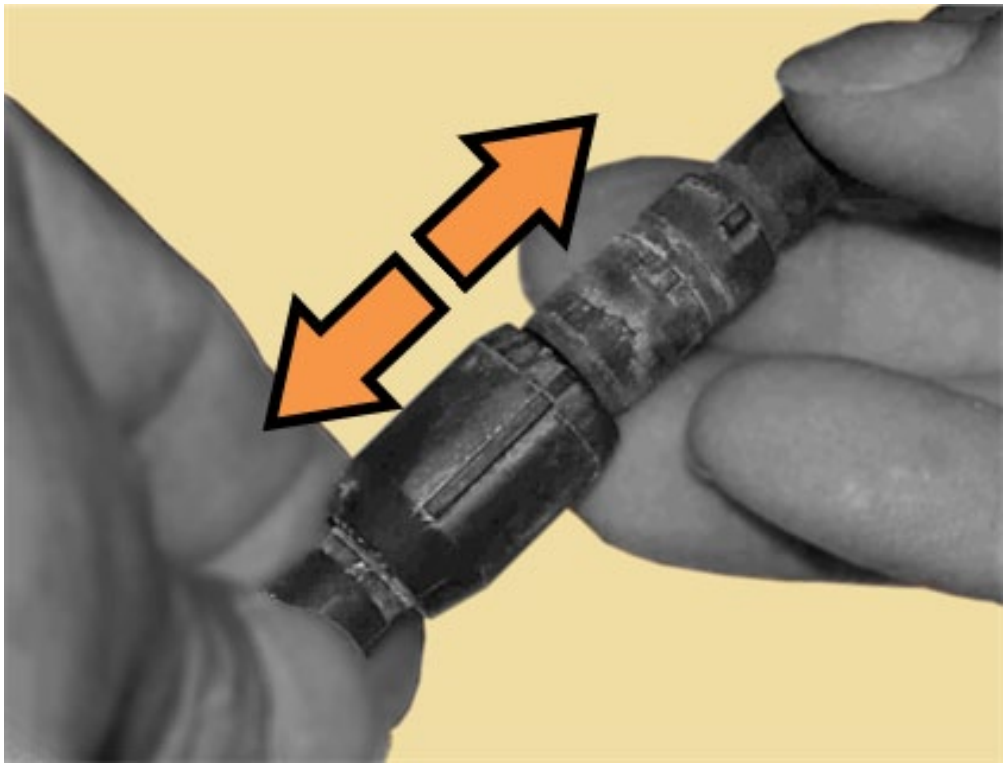


Figure B-15. Disconnect the Fan 1 / Fan 2 Power Supplies

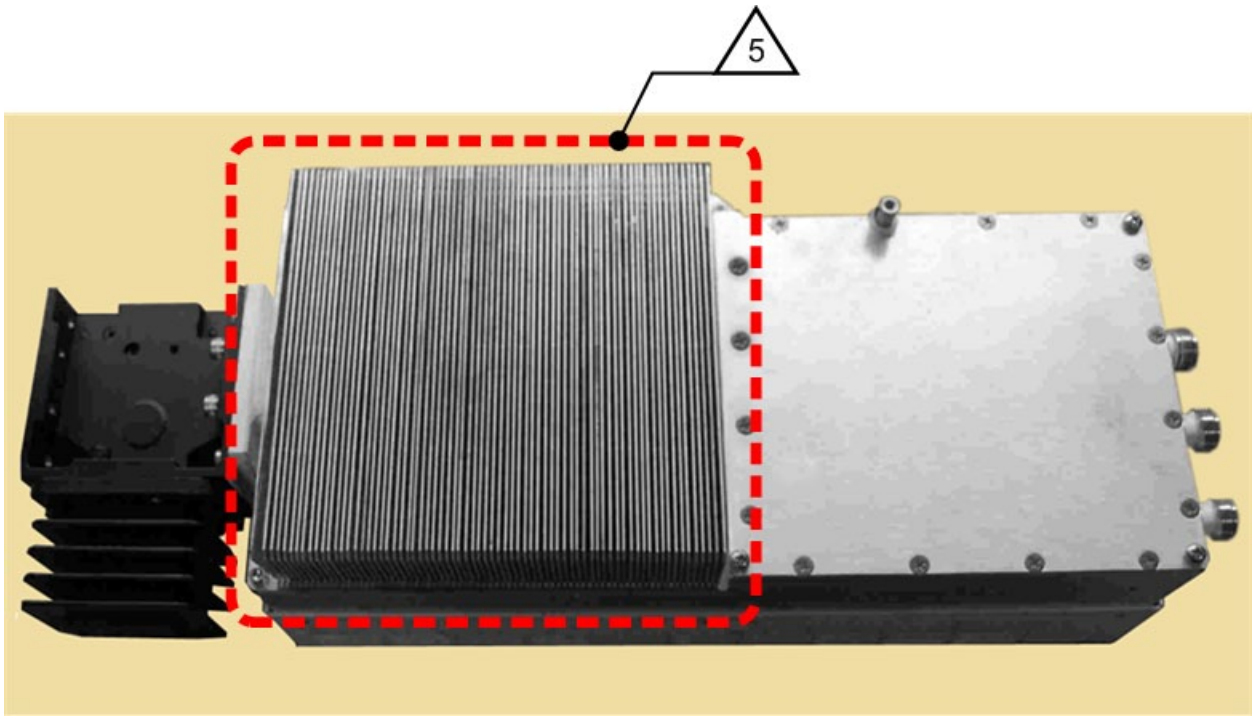


Figure B-16. LPOD-R PS 1.5 Heat Sink Location

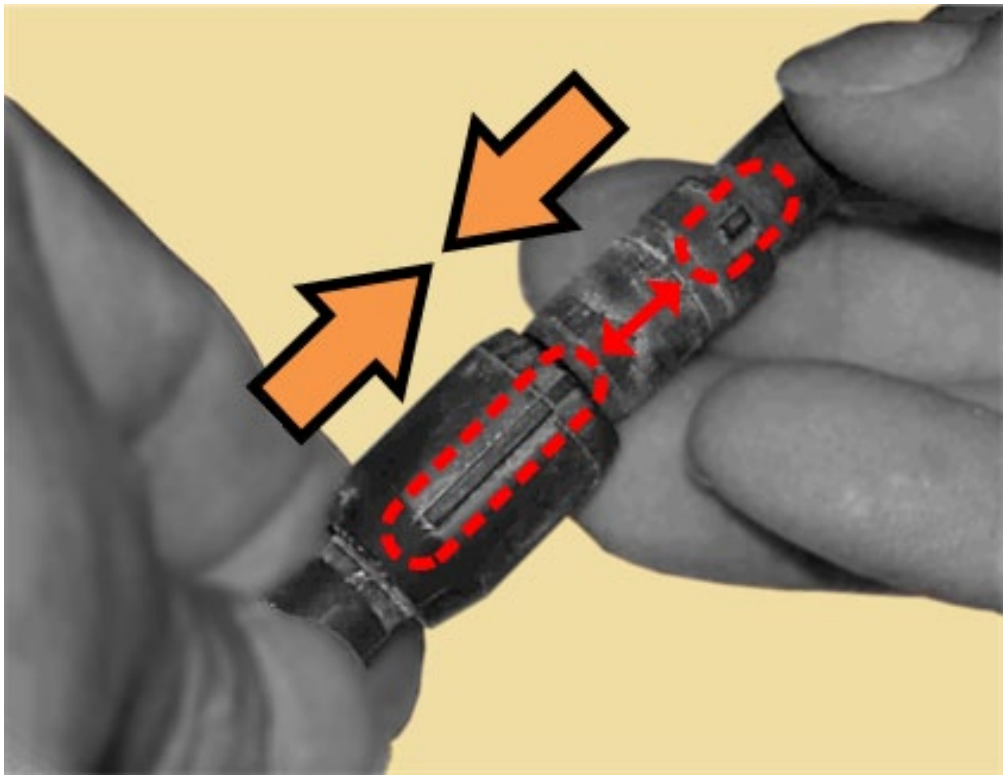


Figure B-17. Reconnect the Fan 1 / Fan 2 Power Supplies

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